

Date: 10 August 1998
 To: Bechtel Hanford Inc. (technical representative)
 From: TechLaw, Inc.
 Project: 100 D Areas - Full Protocol
 Subject: Inorganics - Data Package No. W02330-QES (SDG No. W02330)

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INTRODUCTION

This memo presents the results of data validation on Data Package No. ~~W02330~~ **EDMG** QES prepared by Quanterra Environmental Services (QES). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
BONKT3	04/15/98	Soil	C	See Note 1
BONKT4	04/15/98	Soil	C	See Note 1
BONKT5	04/15/98	Soil	C	See Note 1
BONKT6	04/15/98	Soil	C	See Note 1
BONKT7	04/15/98	Soil	C	See Note 1
BONKT8	04/15/98	Soil	C	See Note 1
BONKT9	04/15/98	Soil	C	See Note 1

1 - ICP metals (6010A), Mercury (7471-CV), Hexavalent Chromium (7196)

Data validation was conducted in accordance with the BHI validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (May 1998). Appendices 1 through 5 provide the following information as indicated below:

- Appendix 1. Glossary of Data Reporting Qualifiers
- Appendix 2. Summary of Data Qualification
- Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
- Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
- Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

Analytical holding times are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be analyzed within 6 months for ICP metals, 28 days for mercury, and 30 days for hexavalent chromium.

All holding times were acceptable.

- **Blanks**

Preparation Blanks

At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations (in ug/L) less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

In the case of negative blank results, if the absolute value exceeds the Contract Required Detection Limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the IDL and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

Due to blank contamination, chromium (ICP) results in samples BONKT3 and BONKT4 were qualified as undetected and flagged "U".

Due to blank contamination, the lead result in sample BONKT4 was qualified as undetected and flagged "U".

All other preparation blank results were acceptable.

Field and Equipment Blanks

One equipment blank (BONKT3) and one field blank (BONKT4) were submitted for

analysis. The barium, chromium, and lead were detected above the IDL in both the equipment and field blank. No other analytes were detected in the field or equipment blank.

- **Accuracy**

Matrix Spike

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 70% to 130%. Samples with a spike recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 69% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 130% or less than 70% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a spike recovery greater than 130% and a sample result less than the IDL, no qualification is required.

Due to a matrix spike recovery of -8.7%, all barium results were rejected and flagged "R".

Due to a matrix spike recovery of 30% and a matrix spike duplicate recovery of 32%, all hexavalent chromium results were qualified as estimates and flagged "J/UJ".

All other matrix spike results were acceptable.

- **Precision**

Laboratory Duplicate Samples

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 30% for solid samples. If RPD values are out of specification and the sample concentration is greater than five times the CRDL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus two times the CRDL and the sample concentration is less than five times the CRDL, all associated sample results are qualified as estimated and flagged "J/UJ". The performance criteria for aqueous laboratory duplicates are an RPD less than 30% for positive sample results greater than five times the CRDL or plus or minus the CRDL for positive sample results less than five times the CRDL. Sample results outside the criteria are qualified as estimates and flagged "J/UJ".

Due to the lack of a matrix spike and matrix spike duplicate recovery, any RPD calculation for barium would be invalid.

All other laboratory duplicate recovery results were acceptable.

Field Duplicate Samples

One pair of field duplicate samples were submitted to QES for analysis as shown below:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>
BONKT5	BONKT6

The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. The RPD for lead was outside QC limits (48%). Under the BHI statement of work no qualification is required. All other field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against CRDLs to ensure that laboratory detection levels meet the required criteria. All reported laboratory detection levels met the analyte specific CRDL.

- **Completeness**

Data package No. W02330-QES (SDG No. W02330) was submitted for validation and verified for completeness. The completion percentage was 87.5%.

MAJOR DEFICIENCIES

Due to a matrix spike recovery of -8.7%, all barium results were rejected and flagged "R".

MINOR DEFICIENCIES

Due to blank contamination, chromium (ICP) results in samples BONKT3 and BONKT4 were qualified as undetected and flagged "U". Due to blank contamination, the lead result in sample BONKT4 was qualified as undetected and flagged "U". Due to a matrix spike recovery of 30% and a matrix spike duplicate

recovery of 32%, all hexavalent chromium results were qualified as estimates and flagged "J/UJ". Data flagged 'J' is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-96-22, Rev. 1, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, May 1998.

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Qualifiers which may be applied by data validators in compliance with BHI validation SOW are as follows:

- U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.
- BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.
- R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.
- UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.
- NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2
Summary of Data Qualification

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DATA QUALIFICATION SUMMARY

SDG: W02330	REVIEWER: TLI	DATE: 08/10/98	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Barium	R	All	MS/MSD recovery
Chromium (ICP)	U	BONKT3, BONKT4	Blank contamination
Lead	U	BONKT4	Blank Contamination
Hexavalent chromium	J/UJ	All	MS/MSD recovery

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Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

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1
INORGANIC ANALYSES DATA SHEET

BONKT3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

[illegible]

Comments:

FORM I - IN

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1
INORGANIC ANALYSES DATA SHEET

BONKT4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

[illegible]R
6

omments:

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INORGANIC ANALYSES DATA SHEET

BONKT5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

[illegible]

Comments :

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1
INORGANIC ANALYSES DATA SHEET

BONKT6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

[illegible]

comments:

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1
INORGANIC ANALYSES DATA SHEET

BONKT7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

[illegible]

Comments:

FORM I - IN

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1
INORGANIC ANALYSES DATA SHEET

BONKT8

Date Received: 04/15/98

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1
INORGANIC ANALYSES DATA SHEET

BONKT9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

[illegible]

omments:

SW-846

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SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: 80426101 MATRIX: SOIL
CLIENT ID: B0NKT3 DATE RECEIVED: 4/15/1998 1:50:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196J
AM-241	1.17E-01	J	5.4E-02	5.8E-02	2.50E-02	pCi/g	79.80%	RICHRC5057
U-234	3.30E-01	J	8.4E-02	9.9E-02	2.14E-02	pCi/g	79.70%	RICHRC5030
U-235	1.02E-02	U	1.5E-02	1.5E-02	2.14E-02	pCi/g	79.70%	RICHRC5030
U-238	2.97E-01	J	8.0E-02	9.3E-02	2.66E-02	pCi/g	79.70%	RICHRC5030
PU-238	1.52E-02		1.5E-02	1.5E-02	1.03E-02	pCi/g	78.40%	RICHRC5010
PU239/40	9.81E-02		3.9E-02	4.1E-02	1.90E-02	pCi/g	78.40%	RICHRC5010
AM-241	1.05E-02	U	1.9E-02	1.9E-02	3.15E-02	pCi/g	N/A	RICHRC5017
CO-60	-9.88E-04	U	3.9E-03	3.9E-03	6.63E-03	pCi/g	N/A	RICHRC5017
CS-137DA	-7.16E-04	U	3.1E-03	3.1E-03	5.14E-03	pCi/g	N/A	RICHRC5017
EU-152	3.08E-03	U	7.4E-03	7.4E-03	1.26E-02	pCi/g	N/A	RICHRC5017
EU-154	1.29E-02	U	1.0E-02	1.0E-02	2.08E-02	pCi/g	N/A	RICHRC5017
EU-155	5.68E-03	U	9.4E-03	9.4E-03	1.53E-02	pCi/g	N/A	RICHRC5017
K-40	3.44E+00		1.6E-01	3.8E-01	N/A	pCi/g	N/A	RICHRC5017
RA-224DA	9.57E-02		1.1E-02	1.4E-02	N/A	pCi/g	N/A	RICHRC5017
RA-226	7.21E-02	J	1.7E-02	1.9E-02	N/A	pCi/g	N/A	RICHRC5017
RA-228	1.15E-01	J	2.4E-02	2.6E-02	N/A	pCi/g	N/A	RICHRC5017
U-238	2.56E-01		2.0E-01	2.0E-01	N/A	pCi/g	N/A	RICHRC5017

Number of Results: 18

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SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: 80426102 MATRIX: SOIL
CLIENT ID: B0NKT4 DATE RECEIVED: 4/15/1998 1:50:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196UJ
AM-241	-3.61E-04	U	7.2E-04	7.2E-04	1.81E-02	pCi/g	84.10%	RICHRC5057
U-234	3.15E-01	J	8.8E-02	1.0E-01	3.86E-02	pCi/g	75.20%	RICHRC5030
U-235	2.21E-02	U	2.4E-02	2.4E-02	3.21E-02	pCi/g	75.20%	RICHRC5030
U-238	3.60E-01	J	9.3E-02	1.1E-01	2.74E-02	pCi/g	75.20%	RICHRC5030
PU-238	1.64E-02	U	2.3E-02	2.3E-02	2.21E-02	pCi/g	40.40%	RICHRC5010
PU239/40	6.48E-02		4.6E-02	4.8E-02	3.29E-02	pCi/g	40.40%	RICHRC5010
AM-241	1.65E-02	U	2.1E-02	2.1E-02	3.54E-02	pCi/g	N/A	RICHRC5017
CO-60	-9.16E-04	U	4.7E-03	4.7E-03	7.82E-03	pCi/g	N/A	RICHRC5017
CS-137DA	-2.10E-03	U	4.7E-03	4.7E-03	7.41E-03	pCi/g	N/A	RICHRC5017
EU-152	4.85E-03	U	1.2E-02	1.2E-02	2.12E-02	pCi/g	N/A	RICHRC5017
EU-154	1.06E-02	U	1.6E-02	1.6E-02	2.92E-02	pCi/g	N/A	RICHRC5017
EU-155	7.26E-03	U	1.5E-02	1.5E-02	2.36E-02	pCi/g	N/A	RICHRC5017
K-40	4.73E+00		2.5E-01	5.4E-01	N/A	pCi/g	N/A	RICHRC5017
RA-224DA	1.26E-01		1.6E-02	2.0E-02	N/A	pCi/g	N/A	RICHRC5017
RA-226	1.39E-01		1.9E-02	2.4E-02	N/A	pCi/g	N/A	RICHRC5017
RA-228	1.72E-01	J	3.8E-02	4.2E-02	N/A	pCi/g	N/A	RICHRC5017
U-238	3.07E-01	U	1.9E-01	1.9E-01	3.18E-01	pCi/g	N/A	RICHRC5017

Number of Results: 18

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SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: 80428103 MATRIX: SOIL
CLIENT ID: B0NKT5 DATE RECEIVED: 4/15/1998 1:50:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196 UJ
AM-241	1.23E-02	J	1.4E-02	1.4E-02	1.11E-02	pCi/g	95.90%	RICHRC5057
U-234	5.91E-01	J	1.1E-01	1.4E-01	2.75E-02	pCi/g	85.10%	RICHRC5030
U-235	2.94E-02	U	2.6E-02	2.6E-02	3.53E-02	pCi/g	85.10%	RICHRC5030
U-238	6.49E-01	J	1.1E-01	1.5E-01	2.88E-02	pCi/g	85.10%	RICHRC5030
PU-238	5.57E-03	U	1.5E-02	1.5E-02	3.65E-02	pCi/g	45.80%	RICHRC5010
PU239/40	1.81E-01		7.3E-02	8.0E-02	3.65E-02	pCi/g	45.80%	RICHRC5010
AM-241	1.91E-02	U	7.5E-02	7.5E-02	1.16E-01	pCi/g	N/A	RICHRC5017
CO-60	1.17E-02	U	6.7E-03	6.8E-03	1.28E-02	pCi/g	N/A	RICHRC5017
CS-137DA	-1.55E-03	U	7.0E-03	7.0E-03	1.09E-02	pCi/g	N/A	RICHRC5017
EU-152	3.81E-03	U	1.7E-02	1.7E-02	2.90E-02	pCi/g	N/A	RICHRC5017
EU-154	-1.12E-02	U	2.5E-02	2.5E-02	4.01E-02	pCi/g	N/A	RICHRC5017
EU-155	-9.54E-03	U	2.4E-02	2.4E-02	3.91E-02	pCi/g	N/A	RICHRC5017
K-40	8.24E+00		3.1E-01	8.8E-01	N/A	pCi/g	N/A	RICHRC5017
RA-224DA	4.68E-01		2.1E-02	5.1E-02	N/A	pCi/g	N/A	RICHRC5017
RA-226	2.92E-01		2.5E-02	3.8E-02	N/A	pCi/g	N/A	RICHRC5017
RA-228	4.38E-01		6.1E-02	7.5E-02	N/A	pCi/g	N/A	RICHRC5017
U-238	4.34E-01	U	5.1E-01	5.1E-01	8.03E-01	pCi/g	N/A	RICHRC5017

Number of Results: 18

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SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: 80426104 MATRIX: SOIL
CLIENT ID: B0NKT6 DATE RECEIVED: 4/15/1998 1:50:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196 UJ
AM-241	5.09E-03	U	1.0E-02	1.0E-02	1.38E-02	pCi/g	74.70%	RICHRC5057
U-234	5.04E-01	J	1.1E-01	1.3E-01	3.11E-02	pCi/g	76.80%	RICHRC5030
U-235	1.72E-02	U	2.2E-02	2.2E-02	3.89E-02	pCi/g	76.80%	RICHRC5030
U-238	6.25E-01	J	1.2E-01	1.6E-01	2.93E-02	pCi/g	76.80%	RICHRC5030
PU-238	-3.55E-03	U	3.2E-03	3.2E-03	5.01E-02	pCi/g	45.60%	RICHRC5010
PU239/40	1.88E-01		7.7E-02	8.4E-02	2.40E-02	pCi/g	45.60%	RICHRC5010
AM-241	-7.88E-03	U	7.3E-02	7.3E-02	1.16E-01	pCi/g	N/A	RICHRC5017
CO-60	-4.35E-03	U	6.9E-03	6.9E-03	1.09E-02	pCi/g	N/A	RICHRC5017
CS-137DA	-3.34E-03	U	6.0E-03	6.0E-03	9.97E-03	pCi/g	N/A	RICHRC5017
EU-152	1.22E-02	U	1.7E-02	1.7E-02	3.00E-02	pCi/g	N/A	RICHRC5017
EU-154	6.71E-03	U	2.5E-02	2.5E-02	4.18E-02	pCi/g	N/A	RICHRC5017
EU-155	3.07E-02	U	2.4E-02	2.4E-02	4.06E-02	pCi/g	N/A	RICHRC5017
K-40	8.26E+00		3.0E-01	8.8E-01	N/A	pCi/g	N/A	RICHRC5017
RA-224DA	4.44E-01		2.0E-02	4.9E-02	N/A	pCi/g	N/A	RICHRC5017
RA-226	2.82E-01		2.4E-02	3.7E-02	N/A	pCi/g	N/A	RICHRC5017
RA-228	4.58E-01		5.6E-02	7.2E-02	N/A	pCi/g	N/A	RICHRC5017
U-238	5.63E-01	U	4.9E-01	4.9E-01	8.05E-01	pCi/g	N/A	RICHRC5017

Number of Results: 18

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SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: 80428105 MATRIX: SOIL
CLIENT ID: B0NKT7 DATE RECEIVED: 4/15/1998 1:50:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
AM-241	1.70E-02	J	1.7E-02	1.7E-02	1.15E-02	pCi/g	82.20%	RICHRC5057
U-234	6.67E-01	J	1.4E-01	1.8E-01	4.27E-02	pCi/g	62.70%	RICHRC5030
U-235	1.87E-02	U	2.5E-02	2.5E-02	4.07E-02	pCi/g	62.70%	RICHRC5030
U-238	6.69E-01	J	1.4E-01	1.8E-01	3.29E-02	pCi/g	62.70%	RICHRC5030
PU-238	2.28E-02	U	2.7E-02	2.7E-02	3.12E-02	pCi/g	51.80%	RICHRC5010
PU239/40	9.95E-02		5.6E-02	5.9E-02	3.54E-02	pCi/g	51.80%	RICHRC5010
AM-241	8.16E-03	U	4.3E-02	4.3E-02	6.67E-02	pCi/g	N/A	RICHRC5017
CO-60	1.29E-02	U	7.2E-03	7.3E-03	1.40E-02	pCi/g	N/A	RICHRC5017
CS-137DA	7.22E-03	U	7.0E-03	7.0E-03	1.23E-02	pCi/g	N/A	RICHRC5017
EU-152	1.12E-02	U	1.7E-02	1.7E-02	2.93E-02	pCi/g	N/A	RICHRC5017
EU-154	1.35E-02	U	2.6E-02	2.6E-02	4.44E-02	pCi/g	N/A	RICHRC5017
EU-155	3.02E-02	U	2.1E-02	2.1E-02	3.42E-02	pCi/g	N/A	RICHRC5017
K-40	8.69E+00		3.3E-01	9.3E-01	N/A	pCi/g	N/A	RICHRC5017
RA-224DA	4.61E-01		2.2E-02	5.1E-02	N/A	pCi/g	N/A	RICHRC5017
RA-226	3.15E-01		3.4E-02	4.6E-02	N/A	pCi/g	N/A	RICHRC5017
RA-228	4.44E-01		6.0E-02	7.4E-02	N/A	pCi/g	N/A	RICHRC5017
U-238	1.93E-01		4.2E-01	4.2E-01	N/A	pCi/g	N/A	RICHRC5047

Number of Results: 18

8/7/98

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SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: 80426106 MATRIX: SOIL
CLIENT ID: B0NKT8 DATE RECEIVED: 4/15/1998 1:50:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA7198J
AM-241	4.97E-02	J	3.1E-02	3.2E-02	1.35E-02	pCi/g	80.10%	RICHRC5057
U-234	5.09E-01	J	1.0E-01	1.3E-01	3.73E-02	pCi/g	80.90%	RICHRC5030
U-235	4.64E-02	J	3.3E-02	3.3E-02	3.73E-02	pCi/g	80.90%	RICHRC5030
U-238	5.06E-01	J	1.0E-01	1.3E-01	3.18E-02	pCi/g	80.90%	RICHRC5030
PU-238	2.75E-02		2.5E-02	2.5E-02	2.25E-02	pCi/g	75.90%	RICHRC5010
PU239/40	3.75E-01		9.2E-02	1.1E-01	1.51E-02	pCi/g	75.90%	RICHRC5010
AM-241	-6.54E-03	U	2.8E-02	2.8E-02	4.45E-02	pCi/g	N/A	RICHRC5017
CO-60	1.48E-02	U	6.6E-03	6.8E-03	1.31E-02	pCi/g	N/A	RICHRC5017
CS-137DA	2.75E-03	U	6.4E-03	6.5E-03	1.07E-02	pCi/g	N/A	RICHRC5017
EU-152	2.11E-02	U	1.6E-02	1.6E-02	2.83E-02	pCi/g	N/A	RICHRC5017
EU-154	1.92E-02	U	2.2E-02	2.2E-02	3.93E-02	pCi/g	N/A	RICHRC5017
EU-155	4.24E-02	U	2.1E-02	2.1E-02	3.39E-02	pCi/g	N/A	RICHRC5017
K-40	8.52E+00		3.3E-01	9.2E-01	N/A	pCi/g	N/A	RICHRC5017
RA-224DA	4.18E-01		2.1E-02	4.7E-02	N/A	pCi/g	N/A	RICHRC5017
RA-226	3.04E-01		3.0E-02	4.3E-02	N/A	pCi/g	N/A	RICHRC5017
RA-228	4.10E-01		5.2E-02	6.6E-02	N/A	pCi/g	N/A	RICHRC5017
U-238	1.33E-01	U	2.4E-01	2.4E-01	3.85E-01	pCi/g	N/A	RICHRC5017

Number of Results: 18

RLK
8/7/98

000024

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: 80426107 MATRIX: SOIL
CLIENT ID: B0NKT9 DATE RECEIVED: 4/15/1998 1:50:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196U
AM-241	6.53E-03	U	1.4E-02	1.4E-02	2.86E-02	pCi/g	77.80%	RICHRC5J17
U-234	6.41E-01	J	1.2E-01	1.6E-01	2.89E-02	pCi/g	72.60%	RICHRC5J30
U-235	3.01E-02	U	2.9E-02	2.9E-02	3.98E-02	pCi/g	72.60%	RICHRC5J30
U-238	7.62E-01	J	1.3E-01	1.8E-01	3.27E-02	pCi/g	72.60%	RICHRC5J30
PU-238	1.94E-02	U	2.9E-02	2.9E-02	4.07E-02	pCi/g	41.90%	RICHRC5J10
PU239/40	1.00E-01		6.4E-02	6.7E-02	4.07E-02	pCi/g	41.90%	RICHRC5J10
AM-241	-7.23E-02	U	8.3E-02	8.3E-02	1.30E-01	pCi/g	N/A	RICHRC5J17
CO-60	9.39E-03	U	7.3E-03	7.4E-03	1.34E-02	pCi/g	N/A	RICHRC5J17
CS-137DA	2.68E-03	U	6.9E-03	7.0E-03	1.19E-02	pCi/g	N/A	RICHRC5J17
EU-152	2.95E-02	U	1.9E-02	1.9E-02	3.35E-02	pCi/g	N/A	RICHRC5J17
EU-154	3.50E-04	U	2.6E-02	2.6E-02	4.09E-02	pCi/g	N/A	RICHRC5J17
EU-155	2.35E-02	U	2.6E-02	2.6E-02	4.42E-02	pCi/g	N/A	RICHRC5J17
K-40	8.88E+00		3.3E-01	9.3E-01	N/A	pCi/g	N/A	RICHRC5J17
RA-224DA	4.72E-01		2.2E-02	5.2E-02	N/A	pCi/g	N/A	RICHRC5J17
RA-226	2.94E-01		2.6E-02	3.9E-02	N/A	pCi/g	N/A	RICHRC5J17
RA-228	4.87E-01		5.9E-02	7.7E-02	N/A	pCi/g	N/A	RICHRC5J17
U-238	3.80E-02	U	5.3E-01	5.3E-01	8.48E-01	pCi/g	N/A	RICHRC5J17

Number of Results: 18

pc
8/7/98

000025

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

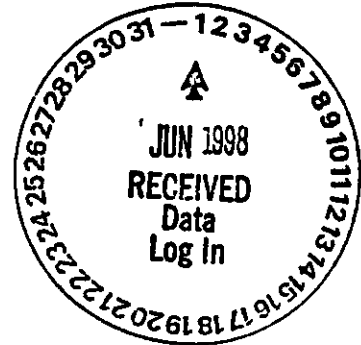
314 298-8566 Telephone
314 298-8757 Fax

CASE NARRATIVE

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, Washington 99352

May 28, 1998

Attention: Joan Kessner



Project Number	:	550.231
SDG	:	W02330
Number of Samples	:	Seven (7)
Sample Matrix	:	Soil
Data Deliverable	:	Summary
Date SDG Closed	:	April 15, 1998

II. Introduction

On April 15, 1998, seven (7) "soil" samples were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. There are no comments or nonconformances associated with the shipping and receiving of these samples. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client ID's:

<u>St. Louis ID</u>	<u>BHL ID</u>	<u>Richland ID</u>	<u>Matrix</u>	<u>Date of Receipt</u>
17539-001	B0NKT3	80426001	Soil	15-APR-98
17539-002	B0NKT4	80426002	Soil	15-APR-98
17539-003	B0NKT5	80426003	Soil	15-APR-98
17539-004	B0NKT6	80426004	Soil	15-APR-98
17539-005	B0NKT7	80426005	Soil	15-APR-98
17539-006	B0NKT8	80426006	Soil	15-APR-98
17539-007	B0NKT9	80426007	Soil	15-APR-98

Bechtel Hanford Incorporated
May 28, 1998
Project Number: 550.231
SDG: W02330
Page 2

III. Analytical Results/ Methodology

The analytical results for this report are presented by analytical test. Each set of data includes sample identification information, analytical results and the appropriate detection limits.

Analyses requested: ICP Metals by EPA method 6010 (Supertrace){Arsenic, Barium, Cadmium, Chromium, Lead, Silver}
 Mercury by EPA method 7471
 Pest/PCBs by EPA method 8080
 Semi-Volatiles by EPA method 8270 (TCL) {Bis(2-ethylhexyl phthalate)}

Deviation from Request: No Deviation from requested methods.

IV. Definitions

The following codes are used to denote laboratory quality control samples and can be found in the data summary section of this report:

QCBLK-	Quality Control Blank, Method Blank
QCLCS-	Quality Control Laboratory Control Sample, Blank Spike
MS-	Matrix Spike
MSD-	Matrix Spike Duplicate

V. Comments

General: No general comments were noted.

Inorganics: A Laboratory Control Sample, Method Blank, Matrix Spike and Matrix Spike Duplicate were analyzed with each preparation batch per the protocol for this analysis.

Bechtel Hanford Incorporated
May 28, 1998
Project Number: 550.231
SDG: W02330
Page 3

Inorganics: (cont.) The recoveries of the matrix spike and the matrix spike duplicate for the following list of elements were not within the 80%-120% range, therefore all associated data was flagged with a "N".

	% REC	% REC
Barium	0	0
Mercury	122.3	121.3

Pest/PCBs: A Laboratory Control Sample, Method Blank, Matrix Spike and Matrix Spike Duplicate were analyzed with each preparation batch per the protocol for this analysis.

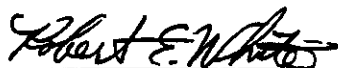
No problems were noted during the analyses of these samples.

Semi-VOA: A Laboratory Control Sample, Method Blank, Matrix Spike and Matrix Spike Duplicate were analyzed with each preparation batch per the protocol for this analysis.

No problems were noted during the analyses of these samples.

I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:



Robert E. White
Project Manager

Quanterra Incorporated
2800 George Washington Way
Richland, Washington 99352

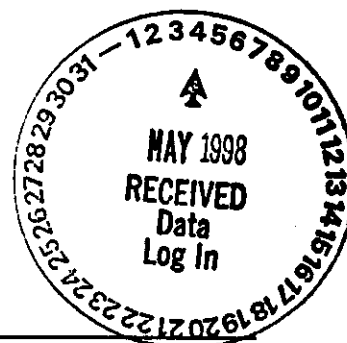
509 375-3131 Telephone
509 375-5590 Fax

CERTIFICATE OF ANALYSIS

Bechtel Hanford, Inc.
3350 George Washington Way
Richland, WA 99352

May 1, 1998

Attention: Joan Kessner



SAF Number	:	B98-022
Date SDG Closed	:	April 15, 1998
Number of Samples	:	Seven (7)
Sample Type	:	Soil
SDG Number	:	W02330
Data Deliverable	:	15 Day Priority/21 Day Summary

I. Introduction

On April 15, 1998, seven 15 day priority, soil samples were received by the Quanterra Environmental Services Richland Laboratory (QESRL) for radiochemical analysis. Upon receipt, the samples were assigned the following laboratory ID numbers to correspond with the Bechtel Hanford, Inc. (BHI) specific IDs:

<u>QESRL ID#</u>	<u>BHI ID#</u>	<u>MATRIX</u>	<u>DATE OF RECEIPT</u>
80426101	BONKT3	Soil	4/15/98
80426102	BONKT4	Soil	4/15/98
80426103	BONKT5	Soil	4/15/98
80426104	BONKT6	Soil	4/15/98
80426105	BONKT7	Soil	4/15/98
80426106	BONKT8	Soil	4/15/98
80426107	BONKT9	Soil	4/15/98

II. Analytical Results/Methodology

The analytical results for this report are presented by laboratory sample ID. Each set of data includes sample identification information, analytical results and the appropriate associated statistical errors.

Bechtel Hanford, Inc.
May 1, 1998
Page 2

The requested analyses were:

Alpha Spectroscopy

Americium-241 by method RICH-RC-5057

Plutonium-238, -239/40 by method RICH-RC-5057

Uranium-234, -235, -238 by method RICH-RC-5030

Gamma Spectroscopy

Gamma Scan by method RICH-RC-5017

Chemical Analyses

Chromium Hex by EPA method 7196

III. Quality Control

The samples analyzed under SDG W02330 were processed as quick turn samples and had two Laboratory Control Samples (LCS and LCS duplicate) and one method (reagent) blank analyzed with the batch. Any exceptions have been noted in the "Comments" section.

Quality control sample results are reported in the same units as sample results.

IV. Comments

Alpha Spectroscopy

Americium-241 by method RICH-RC-5057

The LCS, batch blank, sample duplicate (B0NKT3) and sample results are within contractual requirements. Thorium-228 was present in samples B0NKT3, B0NKT4, B0NKT5 and B0NKT6, therefore, the 85% abundant peak for Am-241 at 5486 KEV was analyzed but the thorium-228 region of interest was not analyzed since it would have interfered with the americium region of interest.

Plutonium-238, -239/40 by method RICH-RC-5010

The LCS, batch blank, sample duplicate (B0NKT3) and sample results are within contractual requirements. The LCS had a high bias of 139.6% recovery. Since the bias met the second level of the evaluation criteria, you gave approval to report the data.

Uranium-234, -235, -238 by method RICH-RC-5030

The LCS, batch blank, sample duplicate (B0NKT3) and sample results are within contractual requirements.

Bechtel Hanford, Inc.

May 1, 1998

Page 3

Gamma Spectroscopy

Gamma Scan by method RICH-RC-5017

The LCS, batch blank, sample duplicate (BONKT3) and sample results are within contractual requirements.

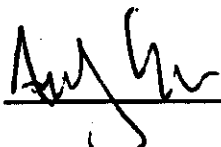
Chemical Analyses

Chromium Hex by EPA method 7196

The LCS, batch blank, sample duplicate (BONKT7) and sample results are within contractual requirements. The MS/MSD (BONKT7) had low recoveries due to matrix interference.

I certify that this Certificate of Analysis is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:



Andy Kopriva
Project Manager

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Bechtel Hanford Inc.

139H-022-11

Collector Mike Stankovich / JRYant	Company/Contact * (Gary Hamilton)	Telephone No. 531-0731	Project Coordinator KORNIER, CC	Date Turnaround 15 Days
Project Designation 100 D Area - Full Protocol	Sampling Location 1607-D2		SAF No. D98-022	
Ice Chest No.	Field Logbook No. EL-1339-2		Method of Shipment Hired Delivery - Government Vehicle	
Shipped To Quantum Incorporated	Onsite Property No. N/A		Bill of Lading/Air Bill No. N/A	
POSSIBLE SAMPLE HAZARD/REMARKS				
Special Handling and/or Storage				
<p style="text-align: center;">804260</p> <p style="text-align: center;">SAMPLE ANALYSIS</p> <p style="text-align: center;">SD- W02330</p>				
Sample No.	Matrix *	Sample Date	Sample Time	
BONKT3 01	Soil	4-15-98	0805	
BONKT4 02	Soil	4-15-98	0800	
BONKT5 03	Soil	4-15-98	0845	
BONKT6 04	Soil	4-15-98	0845	
003				
003				
CHAIN OF POSSESSION				Matrix *
<p>Received By: [Signature] Date/Time: 4-15-98 1350</p> <p>Received By: [Signature] Date/Time: 4-15-98 1350</p> <p>Received By: [Signature] Date/Time: 4-15-98 1350</p> <p>Received By: [Signature] Date/Time: 4-15-98 1350</p> <p>Received By: [Signature] Date/Time: 4-15-98 1350</p> <p>Received By: [Signature] Date/Time: 4-15-98 1350</p>				<p>8 - Soil</p> <p>16 - Sediment</p> <p>20 - Solid</p> <p>21 - Sludge</p> <p>22 - Water</p> <p>23 - Oil</p> <p>24 - Air</p> <p>25 - Dross Solids</p> <p>26 - Dross Liquids</p> <p>27 - Slime</p> <p>28 - Wipe</p> <p>29 - Liquid</p> <p>30 - Vegetation</p> <p>31 - Other</p>
LABORATORY SECTION				Date/Time
FINAL SAMPLE DISPOSITION				Date/Time
Disposed Method				Disposed By

Collector Mike Stankovich / <i>BRYant</i>	Company Contact Gary Hamilton	Telephone No. 531-0731	Project Coordinator KORNER, CC	Data Turnaround 15 Days						
Project Designation 100 D Areas - Full Protocol	Sampling Location 1607-D2	SAF No. B98-022								
Ice Chest No.	Field Logbook No. EL-1339-2	Method of Shipment Hand Delivery - Government Vehicle								
Shipped To Quanterra Incorporated	Offsite Property No. N/A	Bill of Lading/Air Bill No. N/A								
POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	Cool 4C	None	None	None	Cool 4C	Cool 4C	None	
	Type of Container	P	uG	uG	uG	uG	uG	uG	P	
	No. of Container(s)	1	1	1	1	1	1	1	2	
Special Handling and/or Storage	Volume	20ml	60ml	60ml	60ml	60ml	120ml	120ml	1000ml	

SAMPLE ANALYSIS

804260

804261

804261

Sample No.	Matrix *	Sample Date	Sample Time											
DNKT7 05	Soil	4-15-98	0905	Y	X	X	Y 8 ²	X 6 ²	X 8 ²	X 8 ²	Y	A4	X5	
DNKT8 06	Soil	4-15-98	0915	X	X	X	X 6 ²	X 6 ²	X	X	X	A3	A6	
DNKT9 07	Soil	4-15-98	0930	X	X	X	X 6 ²	X 6 ²	X	X	X	A1	B7	
							X 6 ²	X 6 ²	X	X	X			
							X 6 ²	X 6 ²	X	X	X			
							X 6 ²	X 6 ²	X	X	X			
							X 6 ²	X 6 ²	X	X	X			
							X 6 ²	X 6 ²	X	X	X			
							X 6 ²	X 6 ²	X	X	X			
							X 6 ²	X 6 ²	X	X	X			
							X 6 ²	X 6 ²	X	X	X			
							X 6 ²	X 6 ²	X	X	X			
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							X 6 ²	X 6 ²	X	X	X			
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							X 6 ²	X 6 ²	X	X	X			
							X 6 ²	X 6 ²	X	X	X			
							X 6 ²							

CHAIN OF POSSESSION

Sign/Print Names

1350

Inspected By <i>[Signature]</i>	Date/Time 4-15-98	Received By <i>[Signature]</i>	Date/Time 4/15/98
Inspected By	Date/Time	Received By	Date/Time
Inspected By	Date/Time	Received By	Date/Time
Inspected By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

COA - R607D2 2F00

- (1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Silver)
 (2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

Matrix *

- S - Soil
- SS - Sediment
- SO - Solid
- SL - Sludge
- W - Water
- O - Oil
- A - Air
- DS - Drum Solids
- DL - Drum Liquids
- T - Tissue
- WI - Wipe
- L - Liquid
- V - Vegetation
- X - Other

LABORATORY SECTION	Received By	Title	Date/Time
ANAL SAMPLE DISPOSITION	Disposed Method	Disposed By	Date/Time

Appendix 5
Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	<u>C</u>	D	E
PROJECT: 100 D Areas			DATA PACKAGE: W02330		
VALIDATOR: TLI		LAB: QES		DATE: 8/5/98	
CASE:			SDG: W02330		
ANALYSES PERFORMED					
<input checked="" type="checkbox"/> CLP/ICP	<input type="checkbox"/> CLP/GFAA	<input checked="" type="checkbox"/> CLP/Hg	<input type="checkbox"/> CLP/Cyanide	<input checked="" type="checkbox"/> CR VI	<input type="checkbox"/>
<input type="checkbox"/> SW-846/ICP	<input type="checkbox"/> SW-846/GFAA	<input type="checkbox"/> SW-846/Hg	<input type="checkbox"/> SW-846 Cyanide	<input type="checkbox"/>	<input type="checkbox"/>
SAMPLES/MATRIX					
BONKT3, BONKT4, BONKT5, BONKT6, BONKT7					
BONKT8, BONKT9					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? Yes No N/AIs a case narrative present? Yes No N/A

Comments: _____

2. HOLDING TIMES

Are sample holding times acceptable? Yes No N/A

Comments: _____

A-19

000036

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments? Yes No N/A
 Are initial calibrations acceptable? Yes No N/A
 Are ICP interference checks acceptable? Yes No N/A
 Were ICV and CCV checks performed on all instruments? Yes No N/A
 Are ICV and CCV checks acceptable? Yes No N/A

Comments: _____

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses? Yes No N/A
 Are ICB and CCB results acceptable? Yes No N/A
 Were preparation blanks analyzed? Yes No N/A
 Are preparation blank results acceptable? Yes No N/A
 Were field/trip blanks analyzed? Yes No N/A
 Are field/trip blank results acceptable? Yes No N/A

Comments: Chromium (ICP) + lead

T4 + T3 U T4 - U
FB + TB - Barium lead check

5. ACCURACY

Were spike samples analyzed? Yes No N/A
 Are spike sample recoveries acceptable? Yes No N/A
 Were laboratory control samples (LCS) analyzed? Yes No N/A
 Are LCS recoveries acceptable? Yes No N/A

Comments: Barium -8.7

CR G⁺ MSD 32% MS 30% J/W

A-20/2

000037

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

Were laboratory duplicates analyzed?	<u>Yes</u>	No	N/A
Are laboratory duplicate samples RPD values acceptable?	Yes	<u>No</u>	N/A
Were ICP serial dilution samples analyzed?	Yes	No	<u>N/A</u>
Are ICP serial dilution %D values acceptable?	Yes	No	<u>N/A</u>
Are field duplicate RPD values acceptable?	Yes	<u>No</u>	<u>N/A</u>
Are field split RPD values acceptable?	Yes	No	<u>N/A</u>

Comments: Barium -8.7 & -8.0

~~CR6 -8.7 & -8.0~~

~~CR6 -8.7 & -8.0~~

FD had 48%

7. FURNACE AA QUALITY CONTROL

Were duplicate injections performed as required?	Yes	No	<u>N/A</u>
Are duplicate injection %RSD values acceptable?	Yes	No	<u>N/A</u>
Were analytical spikes performed as required?	Yes	No	<u>N/A</u>
Are analytical spike recoveries acceptable?	Yes	No	<u>N/A</u>
Was MSA performed as required?	Yes	No	<u>N/A</u>
Are MSA results acceptable?	Yes	No	<u>N/A</u>

Comments: _____

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses?	<u>Yes</u>	No	N/A
Are all results supported in the raw data?	Yes	No	<u>N/A</u>
Are results calculated properly?	Yes	No	<u>N/A</u>
Do results meet the CRDLs?	Yes	No	N/A

Comments: _____

6A
MATRIX SPIKE DUPLICATES

BONKT3S

~~000101~~

5A
SPIKE SAMPLE RECOVERY

BONKT3S

Contract: 550.231

SAS No.: _____ SDG No.: W02330

Level (low/med): LOW

* Solids for Sample: 98.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

omments:

~~000025~~

000041

3
BLANKS

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

[illegible]

000042

~~000098~~



MATRIX SPIKE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: W0426105 MATRIX: SOIL

ANALYTE	SPIKE RESULT*	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	SAMPLE RESULT	EXPECTED	RECOVERY
HEXCHROME	1.50E+00		N/A	N/A	3.00E-02	mg/kg	3.00E-02	5.00E+00	30.02%

Number of Results: 1

*Spike Result Corrected For Sample Result

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL,
I = No II qualifier and result < MDL

Quanterra Analytical Services, Inc
rptChemRadMatrixSpike; v3.41

0000000000

00-45

MATRIX SPIKE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: W042615D MATRIX: SOIL

ANALYTE	SPIKE RESULT*	COUNTING Q ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	SAMPLE RESULT	EXPECTED	RECOVERY
HEXCHROME	1.60E+00	N/A	N/A	3.00E-02	mg/kg	3.00E-02	5.00E+00	32.03%

Number of Results:

*Spike Result Corrected For Sample Result

Result = IDL When Not Detected

(Q)ualifiers: U = Analyte result < MDA/IDL,
L = No U qualifier and result < IDL

Quanterra Analytical Services, Inc
rptChemRadMatrixSpike; v3.41

000044

0017

Date: 10 August 1998
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 100 D Areas - Full Protocol
Subject: Semivolatiles - Data Package No. W02330-QES (SDG No. W02330)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. W02330-QES prepared by Quanterra Environmental Services (QTES). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
BONKT3	04/15/98	Soil	C	SVOAs by EPA 8270
BONKT4	04/15/98	Soil	C	SVOAs by EPA 8270
BONKT5	04/15/98	Soil	C	SVOAs by EPA 8270
BONKT6	04/15/98	Soil	C	SVOAs by EPA 8270
BONKT7	04/15/98	Soil	C	SVOAs by EPA 8270
BONKT8	04/15/98	Soil	C	SVOAs by EPA 8270
BONKT9	04/15/98	Soil	C	SVOAs by EPA 8270

Data validation was conducted in accordance with the BHI validation statement of work BHI 1997 and the 100 Area Remedial Action Sampling and Analysis Plan (May 1998). Appendices 1 through 5 provide the following information as indicated below:

- Appendix 1. Glossary of Data Reporting Qualifiers
- Appendix 2. Summary of Data Qualification
- Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
- Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
- Appendix 5. Data Validation Supporting Documentation

000001

DATA QUALITY OBJECTIVES

- **Holding Times**

Analytical holding times were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be extracted within 14 days of the date of sample collection and analyzed within 40 days from the date of extraction.

If holding times are exceeded, but not by greater than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

Holding times were met for all samples.

- **Blanks**

Method blank analyses are conducted to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples. No contaminants should be present in the method blank. Analytical results for analytes present in any sample at less than five times the concentration of that analyte found in the associated blank are qualified as non-detects and flagged "U". Common laboratory contaminants present in samples at less than ten times the concentration of that analyte found in the associated blank are qualified as non-detects. If a sample result is less than the CRQL and is less than five times (or less than ten times for lab contaminants) the highest associated blank result, the sample result value is raised to the CRQL level and qualified as undetected "U".

All method blank results were acceptable.

Field and Equipment Blanks

One equipment blank (BONKT3) and one field blank (BONKT4) were submitted for analysis. No analytes were detected in the field or equipment blank.

- **Accuracy**

Matrix Spike/Matrix Spike Duplicate Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using five compounds for which percent recoveries must be within established laboratory quality control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries outside control limits are qualified as estimates and flagged "UJ". Sample results greater than five times the spike concentration require no qualification.

All matrix spike recovery results were acceptable.

Surrogate Recovery

The analyses of surrogate compounds provide a measure of performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the EPA CLP program. If two surrogates of the same class of compounds (base/neutral or acid) are out of control limits, all associated sample results greater than the CRQL are qualified as estimates and flagged "J". Sample results less than the CRQL and below the lower control limit are qualified as estimates and flagged "UJ". Sample results less than the CRQL with recoveries above the upper control limit require no qualification. If a surrogate recovery is less than 10%, detects are qualified as estimates and flagged "J" and nondetects are rejected and flagged "UR".

All surrogate recovery results were acceptable.

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. For samples analyzed using SW-846 protocol, results must be within RPD limits of $\pm 30\%$ for solid samples. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated detected sample results are qualified as estimates and flagged "J". If RPD values are out of specification and the sample

concentration is greater than five times the spike concentration, no qualification is required.

All matrix spike/matrix spike duplicate RPD results were acceptable.

Field Duplicate Samples

One pair of field duplicate samples were submitted to QES for analysis as shown below:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>
BONKT5	BONKT6

The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against CRQLs to ensure that laboratory detection levels meet the required criteria. The reported detection limit was above the CRQL for samples BONKT6, BONKT7, BONKT8, and BONKT9. All other reported analytical detection limits were at or below CRQLs.

- **Completeness**

Data package No. W02330-QES (SDG No. W02330) was submitted for validation and verified for completeness. The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-96-22, Rev. 1, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, May 1998.

Appendix 1
Glossary of Data Reporting Qualifiers

000006

Qualifiers which may be applied by data validators in compliance with the BHI validation SOW are as follows:

- U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the same quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- J - Indicates the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision-making purposes.
- R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.
- UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.
- NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications usable for decision-making purposes).

Appendix 2
Summary of Data Qualification

000008

DATA QUALIFICATION SUMMARY

SDG: W02330	REVIEWER: TLI	DATE: 08/10/98	PAGE <u>1</u> OF <u>1</u>
COMMENTS: No qualifiers assigned			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

[illegible]

000071

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BONKT3

Lab Name: QUANTERRA MO

Contract: 550-231

Lab Code: ITMO

Case No.: S53901

SAS No.:

SDG No.: W02330

Matrix: (soil/water) SOIL

Lab Sample ID: 17539-001

Sample wt/vol: 30.10 (g/mL) G

Lab File ID: A1647

Level: (low/med) LOW

Date Received: 04/15/98

% Moisture: 1 decanted: (Y/N) N

Date Extracted: 04/21/98

Concentrated Extract Volume: 1000 (uL)

Date Analyzed: 04/21/98

Injection Volume: 2.0(uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH:

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.

COMPOUND

Q

117-81-7-----bis(2-Ethylhexyl) Phthalate

330

U

Handwritten signature
6/7/98

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BONKT4

Lab Name: QUANTERRA MO

Contract: 550-231

Lab Code: ITMO

Case No.: S53901

SAS No.:

SDG No.: W02330

Matrix: (soil/water) SOIL

Lab Sample ID: 17539-002

Sample wt/vol: 30.10 (g/mL) G

Lab File ID: A1650

Level: (low/med) LOW

Date Received: 04/15/98

% Moisture: 0 decanted: (Y/N) N

Date Extracted: 04/21/98

Concentrated Extract Volume: 1000 (uL)

Date Analyzed: 04/21/98

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

pH:

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

117-81-7-----bis(2-Ethylhexyl) Phthalate

330

U

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BONKT5

Lab Name: QUANTERRA MO

Contract: 550-231

Lab Code: ITMO

Case No.: S53901

SAS No.:

SDG No.: W02330

Matrix: (soil/water) SOIL

Lab Sample ID: 17539-003

Sample wt/vol: 30.00 (g/mL) G

Lab File ID: A1651

Level: (low/med) LOW

Date Received: 04/15/98

% Moisture: 1 decanted: (Y/N) N

Date Extracted: 04/21/98

Concentrated Extract Volume: 1000 (uL)

Date Analyzed: 04/21/98

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

pH:

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.

COMPOUND

Q

117-81-7-----bis(2-Ethylhexyl) Phthalate

330

U

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

B0NKT6

Lab Name: QUANTERRA MO

Contract: 550-231

Lab Code: ITMO

Case No.: S53901

SAS No.:

SDG No.: W02330

Matrix: (soil/water) SOIL

Lab Sample ID: 17539-004

Sample wt/vol: 30.10 (g/mL) G

Lab File ID: A1652

Level: (low/med) LOW

Date Received: 04/15/98

% Moisture: 2 decanted: (Y/N) N

Date Extracted: 04/21/98

Concentrated Extract Volume: 1000 (uL)

Date Analyzed: 04/21/98

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

pH:

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

117-81-7-----bis(2-Ethylhexyl) Phthalate	340	U
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RP
8/7/98

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BONKT7

Lab Name: QUANTERRA MO

Contract: 550-231

Lab Code: ITMO

Case No.: S53901

SAS No.:

SDG No.: W02330

Matrix: (soil/water) SOIL

Lab Sample ID: 17539-005

Sample wt/vol: 30.10 (g/mL) G

Lab File ID: A1653

Level: (low/med) LOW

Date Received: 04/15/98

% Moisture: 2 decanted: (Y/N) N

Date Extracted: 04/21/98

Concentrated Extract Volume: 1000 (uL)

Date Analyzed: 04/22/98

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

pH:

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

117-81-7-----bis(2-Ethylhexyl) Phthalate

340

U

JPW
8/7/98

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BONKT8

Lab Name: QUANTERRA MO

Contract: 550-231

Lab Code: ITMO

Case No.: S53901

SAS No.:

SDG No.: W02330

Matrix: (soil/water) SOIL

Lab Sample ID: 17539-006

Sample wt/vol: 30.10 (g/mL) G

Lab File ID: A1654

Level: (low/med) LOW

Date Received: 04/15/98

% Moisture: 3 decanted: (Y/N) N

Date Extracted: 04/21/98

Concentrated Extract Volume: 1000 (uL)

Date Analyzed: 04/22/98

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

pH:

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.

COMPOUND

Q

117-81-7-----bis(2-Ethylhexyl) Phthalate

340

U

pk
8/7/98

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BONKT9

Lab Name: QUANTERRA MO

Contract: 550-231

Lab Code: ITMO

Case No.: S53901

SAS No.:

SDG No.: W02330

Matrix: (soil/water) SOIL

Lab Sample ID: 17539-007

Sample wt/vol: 30.10 (g/mL) G

Lab File ID: A1655

Level: (low/med) LOW

Date Received: 04/15/98

% Moisture: 18 decanted: (Y/N) N

Date Extracted: 04/21/98

Concentrated Extract Volume: 1000 (uL)

Date Analyzed: 04/22/98

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

pH:

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

117-81-7-----bis(2-Ethylhexyl) Phthalate

400

U

John
8/1/98

~~000018~~

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

314 298-8566 Telephone
314 298-8757 Fax

CASE NARRATIVE

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, Washington 99352

May 28, 1998

Attention: Joan Kessner



Project Number	:	550.231
SDG	:	W02330
Number of Samples	:	Seven (7)
Sample Matrix	:	Soil
Data Deliverable	:	Summary
Date SDG Closed	:	April 15, 1998

II. Introduction

On April 15, 1998, seven (7) "soil" samples were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. There are no comments or nonconformances associated with the shipping and receiving of these samples. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client ID's:

<u>St. Louis ID</u>	<u>BHL ID</u>	<u>Richland ID</u>	<u>Matrix</u>	<u>Date of Receipt</u>
17539-001	B0NKT3	80426001	Soil	15-APR-98
17539-002	B0NKT4	80426002	Soil	15-APR-98
17539-003	B0NKT5	80426003	Soil	15-APR-98
17539-004	B0NKT6	80426004	Soil	15-APR-98
17539-005	B0NKT7	80426005	Soil	15-APR-98
17539-006	B0NKT8	80426006	Soil	15-APR-98
17539-007	B0NKT9	80426007	Soil	15-APR-98

Bechtel Hanford Incorporated
May 28, 1998
Project Number: 550.231
SDG: W02330
Page 2

III. Analytical Results/ Methodology

The analytical results for this report are presented by analytical test. Each set of data includes sample identification information, analytical results and the appropriate detection limits.

Analyses requested: ICP Metals by EPA method 6010 (Supertrace){Arsenic, Barium, Cadmium, Chromium, Lead, Silver}
 Mercury by EPA method 7471
 Pest/PCBs by EPA method 8080
 Semi-Volatiles by EPA method 8270 (TCL) {Bis(2-ethylhexyl phthalate)}

Deviation from Request: No Deviation from requested methods.

IV. Definitions

The following codes are used to denote laboratory quality control samples and can be found in the data summary section of this report:

QCBLK-	Quality Control Blank, Method Blank
QCLCS-	Quality Control Laboratory Control Sample, Blank Spike
MS-	Matrix Spike
MSD-	Matrix Spike Duplicate

V. Comments

General: No general comments were noted.

Inorganics: A Laboratory Control Sample, Method Blank, Matrix Spike and Matrix Spike Duplicate were analyzed with each preparation batch per the protocol for this analysis.

Bechtel Hanford Incorporated
May 28, 1998
Project Number: 550.231
SDG: W02330
Page 3

Inorganics: (cont.) The recoveries of the matrix spike and the matrix spike duplicate for the following list of elements were not within the 80%-120% range, therefore all associated data was flagged with a "N".

	% REC	% REC
Barium	0	0
Mercury	122.3	121.3

Pest/PCBs: A Laboratory Control Sample, Method Blank, Matrix Spike and Matrix Spike Duplicate were analyzed with each preparation batch per the protocol for this analysis.

No problems were noted during the analyses of these samples.

Semi-VOA: A Laboratory Control Sample, Method Blank, Matrix Spike and Matrix Spike Duplicate were analyzed with each preparation batch per the protocol for this analysis.

No problems were noted during the analyses of these samples.

I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:



Robert E. White
Project Manager

Collector Mike Stankovich / <i>ISRYANT</i>	Company/Contact Gary Hamilton	Telephone No. 531-0731	Project Coordinator KOERNER, CC	Data Turnaround 15 Days							
Project Designation 100 D Areas - Full Protocol	Sampling Location 1607-D2	SAF No. B98-022									
Ice Chest No.	Field Logbook No. EL-1339-2	Method of Shipment Hand Delivery - Government Vehicle									
Shipped To Quanterra Incorporated	Offsite Property No. N/A	Bill of Lading/Air Bill No. N/A									
POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	Cool 4C	None	None	None	Cool 4C	Cool 4C	None		
	Type of Container	P	uG	uG	uG	uG	uG	uG	P		
	No. of Container(s)	1	1	1	1	1	1	1	2		
Special Handling and/or Storage	Volume	20ml	60ml	60ml	60ml	60ml	120ml	120ml	1000ml		

SAMPLE ANALYSIS

SDG

W02330

804260

Sample No.	Matrix *	Sample Date	Sample Time	Asst. by Scan	Chromium Hex - 7194	Americium- 241; Isotopic Plutonium; Isotopic Uranium	See Item (1) in Special Instructions.	Mercury - 7471 - (CV)	Post/PCBs - 8080 (TCL)	Semi-VOCs - 8270A (TCL) [Bis(2- ethylhexyl) phthalate]	See Item (2) in Special Instructions.		
INKT3 01	Soil	4-15-98	0805	X	X	X	X ⁸	X ⁸	X ⁸	X ⁸	X	Eq. 1	1
INKT4 02	Soil	4-15-98	0820	X	X	X	X ⁶	X ⁶	X	X	X	Eq. 2	2
INKT5 03	Soil	4-15-98	0845	X	X	X	X ⁶	X ⁶	X	X	X	Eq. 3	3
INKT6 04	Soil	4-15-98	0845	X	X	X	X ⁸	X ⁸	X	X	X	Eq. 4	4
							100	100	100	100			

CHAIN OF POSSESSION

Sign/Print Names

1350

Received By <i>[Signature]</i>	Date/Time 4-15-98	Received By <i>[Signature]</i>	Date/Time 4/15/98
Received By <i>[Signature]</i>	Date/Time	Received By <i>[Signature]</i>	Date/Time
Received By	Date/Time	Received By	Date/Time
Received By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

COA - R607D2 2F00

- (1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Silver)
 (2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

Matrix *

- S - Soil
- SE - Sediment
- SO - Solid
- SL - Sludge
- W - Water
- O - Oil
- A - Air
- DS - Drum Solids
- DL - Drum Liquids
- T - Tissue
- WI - Wipe
- L - Liquid
- V - Vegetation
- X - Other

LABORATORY SECTION	Received By	Title	Date/Time
NAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Collector Mike Stankovich / <i>BRYANT</i>	Company Contact Gay Hamilton	Telephone No. 531-0731	Project Coordinator KORNER, CC	Data Turnaround 15 Days							
Project Designation 100 D Areas - Full Protocol	Sampling Location 1607-D2	SAF No. B98-022									
Ice Chest No.	Field Logbook No. EL-1339-2	Method of Shipment Hand Delivery - Government Vehicle									
Shipped To Quinterra Incorporated	Offsite Property No. N/A	Bill of Lading/Air Bill No. N/A									
POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	Cool 4C	None	None	None	Cool 4C	Cool 4C	None		
	Type of Container	P	aG	aG	aG	aG	aG	aG	P		
	No. of Container(s)	1	1	1	1	1	1	1	2		
Special Handling and/or Storage	Volume	20ml	60ml	60ml	60ml	60ml	120ml	120ml	1000ml		

SAMPLE ANALYSIS

804260

Activity Sam	Chromium Hex - 7194	Americium-241; Isotopic Phosphorus; Isotopic Uranium	See Item (1) in Special Instructions.	Mercury - 7471 - (CV)	Pb-210 (TCL) 210Pb (TCL)	Semi-VDA - 2170A (TCL) [Silica, oxyfluoride] phosphate]	See Item (2) in Special Instructions.	
	804	261					804261	

Sample No.	Matrix *	Sample Date	Sample Time										
30NKT7 05	Soil	4-15-98	0905	Y	X	X	Y 80	X 60	X 82	X 82	Y	A4	X5
30NKT8 06	Soil	4-15-98	0915	X	X	X	X 60	X 60	X	X	X	A3	A6
30NKT9 07	Soil	4-15-98	0930	X	X	X	X 60	X 60	X	X	X	A1	B7
							X 60	X 60	X	X			
							X 60	X 60	X	X			
							X 60	X 60	X	X			
							X 60	X 60	X	X			
							X 60	X 60	X	X			
							X 60	X 60	X	X			
							X 60	X 60	X	X			

CHAIN OF POSSESSION	Sign/Print Names		SPECIAL INSTRUCTIONS COA - R607D2 2F00 (1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Silver) (2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-159); Gamma Spec - Add-on (Americium-241, Uranium-238)	Matrix *
	Dispatched By <i>[Signature]</i>	Date/Time 4-15-98		
	Received By <i>[Signature]</i>	Date/Time 4-15-98		
	Received By <i>[Signature]</i>	Date/Time 4-15-98		

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Appendix 5
Data Validation Supporting Documentation

GC/MS ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	<u>C</u>	D	E
PROJECT: <u>100 D areas</u>			DATA PACKAGE: <u>W02330</u>		
VALIDATOR:		LAB:		DATE: <u>5/4/18</u>	
CASE:			SDG: <u>W02330</u>		
ANALYSES PERFORMED					
<input type="checkbox"/> CLP Volatiles	<input type="checkbox"/> SW-846 8240 (cap column)	<input type="checkbox"/> SW-846 8280 (packed column)	<input type="checkbox"/> CLP Semivolatiles	<input checked="" type="checkbox"/> SW-846 8270 (cap column)	<input type="checkbox"/> SW-846 (packed column)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SAMPLES/MATRIX					
<u>BONKT3 BONKT4 BONKT5 BONKT6</u>					
<u>BONKT7 BONKT8 BONKT9</u>					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? Yes No N/A

Is a case narrative present? Yes No N/A

Comments: _____

2. HOLDING TIMES

Are sample holding times acceptable? Yes No N/A

Comments: _____

GC/MS ORGANIC DATA VALIDATION CHECKLIST

3. INSTRUMENT TUNING AND CALIBRATION

Is the GC/MS tuning/performance check acceptable?	Yes	No	N/A
Are initial calibrations acceptable?	Yes	No	N/A
Are continuing calibrations acceptable?	Yes	No	N/A

Comments: _____

4. BLANKS

Were laboratory blanks analyzed?	Yes	No	N/A
Are laboratory blank results acceptable?	Yes	No	N/A
Were field/trip blanks analyzed?	Yes	No	N/A
Are field/trip blank results acceptable?	Yes	No	N/A

Comments: _____

5. ACCURACY

Were surrogates/System Monitoring Compounds analyzed?	Yes	No	N/A
Are surrogate/System Monitoring Compound recoveries acceptable?	Yes	No	N/A
Were MS/MSD samples analyzed?	Yes	No	N/A
Are MS/MSD results acceptable?	Yes	No	N/A

Comments: _____

A-2 ✓

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GC/MS ORGANIC DATA VALIDATION CHECKLIST

6. PRECISION

Are MS/MSD RPD values acceptable? Yes No N/A
Are field duplicate RPD values acceptable? Yes No N/A
Are field split RPD values acceptable? Yes No N/A

Comments: _____

7. SYSTEM PERFORMANCE

Were internal standards analyzed? Yes No N/A
Are internal standard areas acceptable? Yes No N/A
Are internal standard retention times acceptable? Yes No N/A

Comments: _____

8. COMPOUND IDENTIFICATION AND QUANTITATION

Is compound identification acceptable? Yes No N/A
Is compound quantitation acceptable? Yes No N/A

Comments: _____

9. REPORTED RESULTS AND QUANTITATION LIMITS

Are results reported for all requested analyses? Yes No N/A
Are all results supported in the raw data? Yes No N/A
Do results meet the CRQLs? Yes No N/A
Has the laboratory properly identified and coded all TIC? . . . Yes No N/A

Comments: TL-9 on

Date: 10 August 1998
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 100 D Areas - Full Protocol
Subject: Pesticide/PCB - Data Package No. W02330-QES (SDG No. W02330)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. W02330-QES prepared by Quanterra Environmental Services (QES). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
BONKT3	04/15/98	Soil	C	Pest/PCBs by EPA 8080
BONKT4	04/15/98	Soil	C	Pest/PCBs by EPA 8080
BONKT5	04/15/98	Soil	C	Pest/PCBs by EPA 8080
BONKT6	04/15/98	Soil	C	Pest/PCBs by EPA 8080
BONKT7	04/15/98	Soil	C	Pest/PCBs by EPA 8080
BONKT8	04/15/98	Soil	C	Pest/PCBs by EPA 8080
BONKT9	04/15/98	Soil	C	Pest/PCBs by EPA 8080

Data validation was conducted in accordance with the BHI validation statement of work (BHI 1997) and the 100 Area Remedial Action Sampling and Analysis Plan (May 1998). Appendices 1 through 5 provide the following information as indicated below:

- Appendix 1. Glossary of Data Reporting Qualifiers
- Appendix 2. Summary of Data Qualification
- Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
- Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
- Appendix 5. Data Validation Supporting Documentation

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DATA QUALITY OBJECTIVES

- **Holding Times**

Analytical holding times were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be extracted within 14 days of the date of sample collection and analyzed within 40 days from the date of extraction.

If holding times are exceeded by less than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detected sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

Holding times were met for all samples.

- **Blanks**

Method blank analyses are performed to determine the extent of laboratory contamination introduced through sampling, sample preparation or analysis. At least one method blank analysis must be conducted for every 20 samples. Method blanks should not contain target compounds at a concentration greater than the CRQL. If target compounds are present, sample results less than five times the blank concentration are qualified as nondetects and flagged "U". If the sample result is less than five times the blank concentration and less than CRQL, the result is qualified as a nondetect, elevated to the CRQL and flagged "U".

All method blank target compound results were acceptable.

Field and Equipment Blanks

One equipment blank (BONKT3) and one field blank (BONKT4) were submitted for analysis. No analytes were detected in the field or equipment blank.

- **Accuracy**

Matrix Spike/Matrix Spike Duplicate Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using six compounds and must be within the

established laboratory quality control limits of 70-130 percent. If spike recoveries are outside control limits, detected sample results less than 5 times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries outside control limits are qualified as estimates and flagged "UJ". Sample results greater than five times the spike concentration require no qualification.

All matrix spike/matrix spike duplicate recovery results were acceptable.

Surrogate Recovery

The analysis of surrogate compounds provide a measure of performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the laboratory. When a surrogate compound recovery is outside the control window, all positively identified target compounds associated with the unacceptable surrogate recoveries are qualified as estimates and flagged "J". Nondetected compounds with surrogate recoveries less than the lower control limit are qualified as having an estimated detection limit and flagged "UJ". Undetected compounds with surrogate recoveries above the upper control limit require no qualification.

All surrogate recovery results were acceptable.

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed as the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Results must be within RPD limits of $\pm 30\%$ for soil samples. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated detected sample results are qualified as estimates and flagged "J". If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

All matrix spike/matrix spike duplicate RPD results were acceptable.

Field Duplicate Samples

One pair of field duplicate samples were submitted to QES for analysis as shown below:

000003

Sample No.

Duplicate Sample No.

BONKT5

BONKT6

The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Detection Levels**

Reported laboratory detection levels are compared against CRQLs to ensure that laboratory detection levels meet the required criteria. The reported analytical detection level for toxaphene was above the CRQL in all samples. Under the BHI statement of work, no qualification is required. All other reported detection levels were at or below the CRQL.

- **Completeness**

Data Package No. W02330-QES (SDG No.W02330) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-96-22, Rev. 1, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, May 1998.

Appendix 1
Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the BHI validation SOW are as follows:

- U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- J - Indicates the compound or analyte was analyzed for and detected. The associated concentration is an estimate, but the data are usable for decision-making purposes.
- R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.
- UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.
- NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2
Summary of Data Qualification

000007

DATA QUALIFICATION SUMMARY

SDG: W02330	REVIEWER: TLI	DATE: 08/10/98	PAGE <u>1</u> OF <u>1</u>
COMMENTS: No qualifiers assigned			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

000008

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

000009

Project: BECHTEL-HANFORD																												
Laboratory: Quanterra																												
Case		SDG: W02386																										
Sample Number		BONKT3		BONKT4		BONKT5		BONKT6		BONKT7		BONKT8		BONKT9														
Location		1607-D2		1607-D2		1607-D2		1607-D2		1607-D2		1607-D2		1607-D2														
Remarks		Equip. Blank		Field Blank				Duplicate																				
Sample Date		04/15/98		04/15/98		04/15/98		04/15/98		04/15/98		04/15/98		04/15/98														
Pest/PCB		CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
alpha-BHC		50	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U										
beta-BHC		50	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U										
delta-BHC		50	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U										
gamma-BHC (Lindane)		50	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U										
Heptachlor		50	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U										
Aldrin		50	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U										
Heptachlor epoxide		50	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U										
Endosulfan I		50	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U										
Dieldrin		50	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U										
4,4'-DDE		50	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U										
Endrin		50	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U										
Endosulfan II		50	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U										
4,4'-DDD		50	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U										
Endosulfan sulfate		50	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U										
4,4'-DDT		50	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U										
Methoxychlor		50	3.3	U	3.3	U	3.3	U	3.4	U	3.4	U	3.4	U	3.4	U	4	U										
Endrin Aldehyde		50	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	2	U										
Tech. Chlordane		50	17	U	17	U	17	U	17	U	17	U	17	U	17	U	20	U										
Toxaphene		50	67	U	66	U	67	U	68	U	68	U	68	U	68	U	81	U										
Aroclor-1221		50	34	U	33	U	33	U	34	U	34	U	34	U	34	U	40	U										
Aroclor-1232		50	34	U	33	U	33	U	34	U	34	U	34	U	34	U	40	U										
Aroclor-1016/1242		50	34	U	33	U	33	U	34	U	34	U	34	U	34	U	40	U										
Aroclor-1248		50	34	U	33	U	33	U	34	U	34	U	34	U	34	U	40	U										
Aroclor-1254		50	34	U	33	U	33	U	34	U	34	U	34	U	34	U	40	U										
Aroclor-1260		50	34	U	33	U	33	U	34	U	34	U	34	U	34	U	40	U										

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: QUANTERRA, MO Contract: 550.231 BONKT3

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W02330

Matrix: (soil/water) SOIL Lab Sample ID: 17539-001

Sample wt/vol: 30.1 (g/ml) G Lab File ID: _____

Level: (low/med) LOW Date Sampled : 04-15-98

% Moisture: not dec. 1 dec. _____ Date Extracted: 04-21-98

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 04-22-98

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.

Compound

Q

319-84-6	alpha-BHC	1.7	U
319-85-7	beta-BHC	1.7	U
319-86-8	delta-BHC	1.7	U
58-89-9	gamma-BHC (Lindane)	1.7	U
76-44-8	Heptachlor	1.7	U
309-00-2	Aldrin	1.7	U
1024-57-3	Heptachlor epoxide	1.7	U
959-98-8	Endosulfan I	1.7	U
60-57-1	Dieldrin	1.7	U
72-55-9	4,4'-DDE	1.7	U
72-20-8	Endrin	1.7	U
33213-65-9	Endosulfan II	1.7	U
72-54-8	4,4'-DDD	1.7	U
1031-07-8	Endosulfan sulfate	1.7	U
50-29-3	4,4'-DDT	1.7	U
72-43-5	Methoxychlor	3.4	U
53494-70-5	Endrin Aldehyde	1.7	U
57-74-9	Tech. Chlordane	17	U
8001-35-2	Toxaphene	67	U
11104-28-2	Aroclor-1221	34	U
11141-28-2	Aroclor-1232	34	U
12674-11-2/53469-21-9	Aroclor-1016/1242	34	U
12672-29-6	Aroclor-1248	34	U
11097-57-4	Aroclor-1254	34	U
11096-82-5	Aroclor-1260	34	U

U: Concentration of analyte is less than the value given.

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PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: QUANTERRA, MO Contract: 550.231 BONKT5

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W02330

Matrix: (soil/water) SOIL Lab Sample ID: 17539-003

Sample wt/vol: 30.1 (g/ml) G Lab File ID: _____

Level: (low/med) LOW Date Sampled: 04-15-98

% Moisture: not dec. 1 dec. _____ Date Extracted: 04-21-98

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 04-22-98

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.

Compound

Q

319-84-6	alpha-BHC	1.7	U
319-85-7	beta-BHC	1.7	U
319-86-8	delta-BHC	1.7	U
58-89-9	gamma-BHC (Lindane)	1.7	U
76-44-8	Heptachlor	1.7	U
309-00-2	Aldrin	1.7	U
1024-57-3	Heptachlor epoxide	1.7	U
959-98-8	Endosulfan I	1.7	U
60-57-1	Dieldrin	1.7	U
72-55-9	4,4'-DDE	1.7	U
72-20-8	Endrin	1.7	U
33213-65-9	Endosulfan II	1.7	U
72-54-8	4,4'-DDD	1.7	U
1031-07-8	Endosulfan sulfate	1.7	U
50-29-3	4,4'-DDT	1.7	U
72-43-5	Methoxychlor	3.3	U
53494-70-5	Endrin Aldehyde	1.7	U
57-74-9	Tech. Chlordane	17	U
8001-35-2	Toxaphene	67	U
11104-28-2	Aroclor-1221	33	U
11141-28-2	Aroclor-1232	33	U
12674-11-2/53469-21-9	Aroclor-1016/1242	33	U
12672-29-6	Aroclor-1248	33	U
11097-57-4	Aroclor-1254	33	U
11096-82-5	Aroclor-1260	33	U

U: Concentration of analyte is less than the value given.

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PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: QUANTERRA,MO Contract: 550.231 BONKT6

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W02330

Matrix: (soil/water) SOIL Lab Sample ID: 17539-004

Sample wt/vol: 30.1 (g/ml) G Lab File ID: _____

Level: (low/med) LOW Date Sampled : 04-15-98

% Moisture: not dec. 2 dec. _____ Date Extracted: 04-21-98

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 04-22-98

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO. Compound Q

319-84-6	alpha-BHC	1.7	U
319-85-7	beta-BHC	1.7	U
319-86-8	delta-BHC	1.7	U
58-89-9	gamma-BHC (Lindane)	1.7	U
76-44-8	Heptachlor	1.7	U
309-00-2	Aldrin	1.7	U
1024-57-3	Heptachlor epoxide	1.7	U
959-98-8	Endosulfan I	1.7	U
60-57-1	Dieldrin	1.7	U
72-55-9	4,4'-DDE	1.7	U
72-20-8	Endrin	1.7	U
33213-65-9	Endosulfan II	1.7	U
72-54-8	4,4'-DDD	1.7	U
1031-07-8	Endosulfan sulfate	1.7	U
50-29-3	4,4'-DDT	1.7	U
72-43-5	Methoxychlor	3.4	U
53494-70-5	Endrin Aldehyde	1.7	U
57-74-9	Tech. Chlordane	17	U
8001-35-2	Toxaphene	68	U
11104-28-2	Aroclor-1221	34	U
11141-28-2	Aroclor-1232	34	U
12674-11-2/53469-21-9	Aroclor-1016/1242	34	U
12672-29-6	Aroclor-1248	34	U
11097-57-4	Aroclor-1254	34	U
11096-82-5	Aroclor-1260	34	U

U: Concentration of analyte is less than the value given.

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PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: QUANTERRA, MO Contract: 550.231 BONKT7

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W02330

Matrix: (soil/water) SOIL Lab Sample ID: 17539-005

Sample wt/vol: 30.1 (g/ml) G Lab File ID: _____

Level: (low/med) LOW Date Sampled: 04-15-98

% Moisture: not dec. 2 dec. _____ Date Extracted: 04-21-98

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 04-22-98

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.	Compound	Q
319-84-6	alpha-BHC	U
319-85-7	beta-BHC	U
319-86-8	delta-BHC	U
58-89-9	gamma-BHC (Lindane)	U
76-44-8	Heptachlor	U
309-00-2	Aldrin	U
1024-57-3	Heptachlor epoxide	U
959-98-8	Endosulfan I	U
60-57-1	Dieldrin	U
72-55-9	4,4'-DDE	U
72-20-8	Endrin	U
33213-65-9	Endosulfan II	U
72-54-8	4,4'-DDD	U
1031-07-8	Endosulfan sulfate	U
50-29-3	4,4'-DDT	U
72-43-5	Methoxychlor	U
53494-70-5	Endrin Aldehyde	U
57-74-9	Tech. Chlordane	U
8001-35-2	Toxaphene	U
11104-28-2	Aroclor-1221	U
11141-28-2	Aroclor-1232	U
12674-11-2/53469-21-9	Aroclor-1016/1242	U
12672-29-6	Aroclor-1248	U
11097-57-4	Aroclor-1254	U
11096-82-5	Aroclor-1260	U

U: Concentration of analyte is less than the value given.

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PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: QUANTERRA, MO Contract: 550.231 BONKT8

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W02330

Matrix: (soil/water) SOIL Lab Sample ID: 17539-006

Sample wt/vol: 30.2 (g/ml) G Lab File ID: _____

Level: (low/med) LOW Date Sampled: 04-15-98

% Moisture: not dec. 3 dec. _____ Date Extracted: 04-21-98

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 04-22-98

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

Q

CAS NO.	Compound	CONCENTRATION UNITS: (ug/L or ug/Kg) <u>UG/KG</u>	<u>Q</u>
319-84-6	alpha-BHC	1.7	U
319-85-7	beta-BHC	1.7	U
319-86-8	delta-BHC	1.7	U
58-89-9	gamma-BHC (Lindane)	1.7	U
76-44-8	Heptachlor	1.7	U
309-00-2	Aldrin	1.7	U
1024-57-3	Heptachlor epoxide	1.7	U
959-98-8	Endosulfan I	1.7	U
60-57-1	Dieldrin	1.7	U
72-55-9	4,4'-DDE	1.7	U
72-20-8	Endrin	1.7	U
33213-65-9	Endosulfan II	1.7	U
72-54-8	4,4'-DDD	1.7	U
1031-07-8	Endosulfan sulfate	1.7	U
50-29-3	4,4'-DDT	1.7	U
72-43-5	Methoxychlor	3.4	U
53494-70-5	Endrin Aldehyde	1.7	U
57-74-9	Tech. Chlordane	17	U
8001-35-2	Toxaphene	68	U
11104-28-2	Aroclor-1221	34	U
11141-28-2	Aroclor-1232	34	U
12674-11-2/53469-21-9	Aroclor-1016/1242	34	U
12672-29-6	Aroclor-1248	34	U
11097-57-4	Aroclor-1254	34	U
11096-82-5	Aroclor-1260	34	U

U: Concentration of analyte is less than the value given.

FORM I PEST

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1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: QUANTERRA, MO Contract: 550.231 BONKT9

Lab Code: ITMO Case No.: _____ SAS No.: _____ SDG No.: W02330

Matrix: (soil/water) SOIL Lab Sample ID: 17539-007

Sample wt/vol: 30.0 (g/ml) G Lab File ID: _____

Level: (low/med) LOW Date Sampled: 04-15-98

% Moisture: not dec. 18 dec. _____ Date Extracted: 04-21-98

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 04-22-98

GPC Cleanup: (Y/N) N pH: _____ Dilution Factor: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.	Compound	Q
319-84-6	alpha-BHC	2.0 U
319-85-7	beta-BHC	2.0 U
319-86-8	delta-BHC	2.0 U
58-89-9	gamma-BHC (Lindane)	2.0 U
76-44-8	Heptachlor	2.0 U
309-00-2	Aldrin	2.0 U
1024-57-3	Heptachlor epoxide	2.0 U
959-98-8	Endosulfan I	2.0 U
60-57-1	Dieldrin	2.0 U
72-55-9	4,4'-DDE	2.0 U
72-20-8	Endrin	2.0 U
33213-65-9	Endosulfan II	2.0 U
72-54-8	4,4'-DDD	2.0 U
1031-07-8	Endosulfan sulfate	2.0 U
50-29-3	4,4'-DDT	2.0 U
72-43-5	Methoxychlor	4.0 U
53494-70-5	Endrin Aldehyde	2.0 U
57-74-9	Tech. Chlordane	20 U
8001-35-2	Toxaphene	81 U
11104-28-2	Aroclor-1221	40 U
11141-28-2	Aroclor-1232	40 U
12674-11-2/53469-21-9	Aroclor-1016/1242	40 U
12672-29-6	Aroclor-1248	40 U
11097-57-4	Aroclor-1254	40 U
11096-82-5	Aroclor-1260	40 U

U: Concentration of analyte is less than the value given.

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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

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Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

314 298-8566 Telephone
314 298-8757 Fax

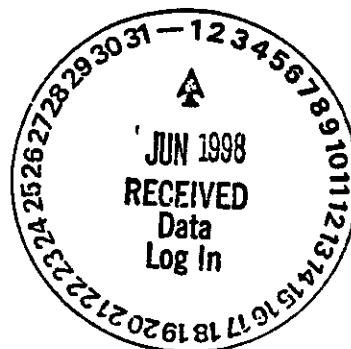


CASE NARRATIVE

Bechtel Hanford Incorporated
3350 George Washington Way
Richland, Washington 99352

May 28, 1998

Attention: Joan Kessner



Project Number	:	550.231
SDG	:	W02330
Number of Samples	:	Seven (7)
Sample Matrix	:	Soil
Data Deliverable	:	Summary
Date SDG Closed	:	April 15, 1998

II. Introduction

On April 15, 1998, seven (7) "soil" samples were received by Quanterra, Richland and transferred to Quanterra, St. Louis for chemical analysis. There are no comments or nonconformances associated with the shipping and receiving of these samples. Upon receipt, the samples were given the following laboratory ID numbers to correspond with the specific client ID's:

<u>St. Louis ID</u>	<u>BHUID</u>	<u>Richland ID</u>	<u>Matrix</u>	<u>Date of Receipt</u>
17539-001	B0NKT3	80426001	Soil	15-APR-98
17539-002	B0NKT4	80426002	Soil	15-APR-98
17539-003	B0NKT5	80426003	Soil	15-APR-98
17539-004	B0NKT6	80426004	Soil	15-APR-98
17539-005	B0NKT7	80426005	Soil	15-APR-98
17539-006	B0NKT8	80426006	Soil	15-APR-98
17539-007	B0NKT9	80426007	Soil	15-APR-98

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May 28, 1998
Project Number: 550.231
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III. Analytical Results/ Methodology

The analytical results for this report are presented by analytical test. Each set of data includes sample identification information, analytical results and the appropriate detection limits.

Analyses requested: ICP Metals by EPA method 6010 (Supertrace){Arsenic, Barium, Cadmium, Chromium, Lead, Silver}
 Mercury by EPA method 7471
 Pest/PCBs by EPA method 8080
 Semi-Volatiles by EPA method 8270 (TCL) {Bis(2-ethylhexyl phthalate)}

Deviation from Request: No Deviation from requested methods.

IV. Definitions

The following codes are used to denote laboratory quality control samples and can be found in the data summary section of this report:

QCBLK-	Quality Control Blank, Method Blank
QCLCS-	Quality Control Laboratory Control Sample, Blank Spike
MS-	Matrix Spike
MSD-	Matrix Spike Duplicate

V. Comments

General: No general comments were noted.

Inorganics: A Laboratory Control Sample, Method Blank, Matrix Spike and Matrix Spike Duplicate were analyzed with each preparation batch per the protocol for this analysis.

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8/7/98

Bechtel Hanford Incorporated
May 28, 1998
Project Number: 550.231
SDG: W02330
Page 3

Inorganics: (cont.) The recoveries of the matrix spike and the matrix spike duplicate for the following list of elements were not within the 80%-120% range, therefore all associated data was flagged with a "N".

	% REC	% REC
Barium	0	0
Mercury	122.3	121.3

Pest/PCBs: A Laboratory Control Sample, Method Blank, Matrix Spike and Matrix Spike Duplicate were analyzed with each preparation batch per the protocol for this analysis.

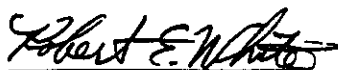
No problems were noted during the analyses of these samples.

Semi-VOA: A Laboratory Control Sample, Method Blank, Matrix Spike and Matrix Spike Duplicate were analyzed with each preparation batch per the protocol for this analysis.

No problems were noted during the analyses of these samples.

I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:



Robert E. White
Project Manager

J

Collector Mike Stankovich / <i>BRyant</i>	Company/Contact Gary Hamilton	Telephone No. 531-0731	Project Coordinator KIMBER, CC	Data Turnaround 15 Days							
Project Designation 100 D Areas - Full Protocol	Sampling Location 1607-D2	SAF No. 098-022									
Ice Chest No.	Field Logbook No. EL-1339-2	Method of Shipment Hand Delivery - Government Vehicle									
Shipped To Quanterra Incorporated	Offsite Property No. N/A	Bill of Lading/Air Bill No. N/A									
POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	Cool 4C	None	None	None	Cool 4C	Cool 4C	None		
	Type of Container	P	2G	2G	2G	2G	2G	2G	P		
	No. of Container(s)	1	1	1	1	1	1	1	2		
Special Handling and/or Storage	Volume	20ml	60ml	60ml	60ml	60ml	120ml	120ml	1000ml		

SAMPLE ANALYSIS

SDG

W02330

804260

Ascidic Scan	Chromium Hex - 7190	Americium- 241; Isotope Plutonium; Isotope Uranium	See Item (1) in Special Instructions.	Mercury - 2471 - (CV)	Lead/PCBs - 1000 (TCL)	Soil-VOA - 4270A (TCL) (Bis(2- ethylhexyl) phthalate)	See Item (3) in Special Instructions.
	804 260		-	-	-	-	804260

Sample No.	Matrix *	Sample Date	Sample Time											
30NKT3	01	Soil	4-15-98	0805	X	X	X	X ⁸	X ⁸	X ⁸	X ⁸	✓	Eg-1	1
30NKT4	02	Soil	4-15-98	0820	X	X	X	X ⁶	X ⁶	X ⁶	X ⁶	✓	F.W	2
30NKT5	03	Soil	4-15-98	0845	X	X	X	X ⁶	X ⁶	X ⁶	X ⁶	X	A2	3
30NKT6	04	Soil	4-15-98	0845	X	X	X	X ⁸	X ⁸	X ⁸	X ⁸	X	A2	4
								100	100	100	100			

CHAIN OF POSSESSION

Sign/Print Names

1350

Obtained By <i>Mike Stankovich</i>	Date/Time 4-15-98	Received By <i>Shadelberg</i>	Date/Time 4/15/98
Obtained By	Date/Time	Received By <i>L100CPG</i>	Date/Time
Obtained By	Date/Time	Received By	Date/Time
Obtained By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

COA - R407D2 2P00

- (1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Silver)
 (2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

Matrix *

- S - Soil
- SS - Sediment
- SO - Solid
- SL - Sludge
- W - Water
- O - Oil
- A - Air
- DS - Drum Solids
- DL - Drum Liquids
- T - Tissue
- WI - Wipe
- L - Liquid
- V - Vegetation
- X - Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposed Method	Disposed By	Date/Time

Appendix 5
Data Validation Supporting Documentation

PESTICIDE/PCB DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	<u>C</u>	D	E
PROJECT: 100 D Area			DATA PACKAGE: W02330		
VALIDATOR: TLI		LAB: QES		DATE: 8/4/98	
CASE:			SDG: W02330		
ANALYSES PERFORMED					
<input type="checkbox"/> CLP3/90	<input checked="" type="checkbox"/> SW-846 8080	<input type="checkbox"/> SW-846 8081	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SAMPLES/MATRIX					
BONKT3, BONKT4, BONKT5, BONKT6					
BONKT7, BONKT8, BONKT9					
Soil					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? Yes No N/A
 Is a case narrative present? Yes No N/A
 Comments: _____

2. HOLDING TIMES

Are sample holding times acceptable? Yes No N/A
 Comments: _____

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

3.1 INSTRUMENT PERFORMANCE (METHOD 8080 AND 8081)

Are DDT retention times acceptable Yes No N/A
 Are calibration standard retention times acceptable? Yes No N/A
 Are DDT and endrin breakdowns acceptable? Yes No N/A

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PESTICIDE/PCB DATA VALIDATION CHECKLIST

Are DBC retention times acceptable? Yes No **N/A**
Is the GC/MS tuning/performance check acceptable? Yes No **N/A**
Comments: _____

3.2 CALIBRATIONS (METHOD 8080 AND 8081)

Are EVAL standard calibration factors and
%RSD values acceptable? Yes No **N/A**
Are quantitation column calibration factor
%RSD values acceptable? Yes No **N/A**
Were the analytical sequence requirements met? Yes No **N/A**
Are continuing calibration %D values acceptable? Yes No **N/A**
Comments: _____

3.3 INSTRUMENT PERFORMANCE AND INITIAL CALIBRATION (3/90 SOW)

Was the initial calibration sequence performed? Yes No **N/A**
Was the resolution acceptable in the resolution check mix? . . Yes No **N/A**
Is resolution acceptable in the PEM, INDA and INDB? Yes No **N/A**
Are DDT and Endrin breakdowns acceptable? Yes No **N/A**
Are retention times in PEMs and calibration mixes acceptable? . Yes No **N/A**
Are RPD values in the PEMs acceptable? Yes No **N/A**
Are %RSD values acceptable? Yes No **N/A**
Comments: _____

3.4 CALIBRATION VERIFICATION (3/90 SOW)

Were the analytical sequence requirements met? Yes No **N/A**
Is resolution acceptable in the PEMs? Yes No **N/A**
Are initial calibrations acceptable? Yes No **N/A**

A-6

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PESTICIDE/PCB DATA VALIDATION CHECKLIST

Are retention times acceptable in the PEMs, INDA and INDB mixes?	Yes	No	N/A
Are RPD values in the PEMs acceptable?	Yes	No	N/A
Are the DDT and endrin breakdowns acceptable?	Yes	No	N/A
Was GPC cleanup performed?	Yes	No	N/A
Is the GPC calibration check acceptable?	Yes	No	N/A
Was Florisil cleanup performed?	Yes	No	N/A
Is the Florisil performance check acceptable?	Yes	No	N/A

Comments: _____

4. BLANKS

Were laboratory blanks analyzed?	Yes	No	N/A
Are laboratory blank results acceptable?	Yes	No	N/A
Were field/trip blanks analyzed?	Yes	No	N/A
Are field/trip blank results acceptable?	Yes	No	N/A

Comments: _____

5. ACCURACY

Were surrogates analyzed?	Yes	No	N/A
Are surrogate recoveries acceptable?	Yes	No	N/A
Were MS/MSD samples analyzed?	Yes	No	N/A
Are MS/MSD results acceptable?	Yes	No	N/A
Were LCS samples analyzed?	Yes	No	N/A
Are LCS results acceptable?	Yes	No	N/A

Comments: _____

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PESTICIDE/PCB DATA VALIDATION CHECKLIST

6. PRECISION

Are MS/MSD RPD values acceptable? ☒ Yes No ☐ N/A
Are laboratory duplicate results acceptable? ☒ Yes No ☐ N/A
Are field duplicate RPD values acceptable? ☒ Yes No ☐ N/A
Are field split RPD values acceptable? ☒ Yes No ☐ N/A

Comments: 4,4' DDT - undetect

7. SYSTEM PERFORMANCE

Is chromatographic performance acceptable? ☒ Yes No ☐ N/A
Are positive results resolved acceptably? ☒ Yes No ☐ N/A

Comments: _____

8. COMPOUND IDENTIFICATION AND QUANTITATION

Is compound identification acceptable? ☒ Yes No ☐ N/A
Is compound quantitation acceptable? ☒ Yes No ☐ N/A

Comments: _____

9. REPORTED RESULTS AND QUANTITATION LIMITS

Are results reported for all requested analyses? ☒ Yes No ☐ N/A
Are all results supported in the raw data? ☒ Yes No ☐ N/A
Do results meet the CRQLs? ☒ Yes ☐ No ☐ N/A

Comments: Toxaphene - all samples

Date: 10 August 1998
To: Bechtel Hanford, Inc. (technical representative)
From: TechLaw, Inc.
Project: 100 D Area - Full Protocol
Subject: Radiochemistry - Data Package No. W02330-QES (SDG No. W02330)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. W02330-QES which was prepared by Quanterra Environmental Services (QES). A list of samples validated along with the analyses reported and the requested analyte is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
BONKT3	04/15/98	Soil	C	See note 1
BONKT4	04/15/98	Soil	C	See note 1
BONKT5	04/15/98	Soil	C	See note 1
BONKT6	04/15/98	Soil	C	See note 1
BONKT7	04/15/98	Soil	C	See note 1
BONKT8	04/15/98	Soil	C	See note 1
BONOT9	04/15/98	Soil	C	See note 1

1 - Gamma spectroscopy (RICHR5017), alpha spectroscopy (RICHR5057/5030)

Data validation was conducted in accordance with the BHI validation statement of work (BHI 1997) and the 100 Area Sampling and Analysis Plan (May 1998). Appendices 1 through 5 provide the following information as indicated below:

- Appendix 1. Glossary of Data Reporting Qualifiers
- Appendix 2. Summary of Data Qualification
- Appendix 3. Qualified Data Summary and Annotated Laboratory Reports
- Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
- Appendix 5. Data Validation Supporting Documentation

DATA QUALITY OBJECTIVES

- **Holding Times**

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for all analytes is 6 months.

All holding times were acceptable.

- **Blanks**

Laboratory Blanks

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the MDA, the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the MDA are elevated to the MDA and qualified as undetected and flagged "U"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

Due to laboratory blank contamination, plutonium-238 results in samples BONTK3 and BONTK8 were qualified as estimates and flagged "J".

Due to laboratory blank contamination, the negative plutonium-238 result in sample BONTK6 was elevated to the MDA and qualified as undetected "U".

Due to laboratory blank contamination, plutonium-239/240 results in all samples (except BONTK8) were qualified as estimates and flagged "J".

Due to laboratory blank contamination, radium-224 results in samples BONTK3 and BONTK4 were qualified as estimates and flagged "J".

Due to laboratory blank contamination, radium-226 results in all samples were qualified as estimates and flagged "J".

All other blank results were acceptable.

Field and Equipment Blanks

One equipment blank (BONTK3) and one field blank (BONTK4) were submitted for analysis. The following analytes were detected in the equipment blank: americium-241 (alpha spec), uranium-234 (alpha spec), uranium-238 (alpha spec), plutonium-238, plutonium-239/240, potassium-40, radium-222, radium-

226, radium-228, and uranium-238 (GEA). The following analytes were detected in the field blank: americium-241 (alpha spec), uranium-234 (alpha spec), uranium-238 (alpha spec), plutonium-239/240, potassium-40, radium-222, radium-224, and radium-228. Under the BHI statement of work, no qualification is required. No other analytes were detected in the field or equipment blank.

- **Accuracy**

Accuracy is evaluated by analyzing distilled water or field samples spiked with known amounts of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample recovery range is 70% to 130%, while that for a matrix spike is 70% to 130%. In addition, samples may be spiked with a radiochemical tracer to assist in isolating the radioisotope of interest with the yield of the tracer being used in calculating sample activity. The acceptable range for tracer recovery is 20% to 105%. Spike sample results outside the above ranges result in associated sample results being qualified as estimates, rejected, or not qualified, depending on the activity of the individual sample.

Due to an LCS recovery of 139%, plutonium-239/240 results in all samples were qualified as estimates and flagged "J".

Due to an LCS recovery of 42%, all uranium-238 results were qualified as estimates and flagged "J/UJ".

All other accuracy results were acceptable.

- **Precision**

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Precision may also be assessed using unspiked duplicate sample analyses. Control limits are +/- 30% for both soil and water samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

Due to RPDs outside QC limits, all samples results for the following analytes were qualified as estimates and flagged "J/UJ": K-40, Ra-224/226/228.

All other duplicate results were acceptable.

Field Duplicate Samples

One pair of field duplicate samples were submitted to QES for analysis as shown below:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>
BONKT5	BONKT6

The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Detection Levels**

Reported laboratory detection levels are reviewed to ensure that they are at or below the contract required MDA. Reported detection levels were above the MDA for U-238 in samples BONKT4, BONKT5, BONKT6, BONKT8, and BONKT9 above for Am-241 (GEA) in samples BONKT5, BONKT6, and BONKT9. All other reported MDAs were at or below the analyte-specific CRDL.

- **Completeness**

Data Package No. W02330 (SDG No. W02330) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to laboratory blank contamination, plutonium-238 results in samples BONTK3 and BONTK8 were qualified as estimates and flagged "J". Due to laboratory blank contamination, the negative plutonium-238 result in sample BONTK6 was elevated to the MDA and qualified as undetected "U". Due to laboratory blank contamination, plutonium-239/240 results in all samples (except BONKT8) were qualified as estimates and flagged "J". Due to laboratory blank contamination, radium-224 results in samples BONKT3 and BONKT4 were qualified as estimates and flagged "J". Due to laboratory blank contamination, radium-226 results in all samples were qualified as estimates and flagged "J". Due to an LCS recovery of 139%, plutonium-239/240 results in all samples were qualified as estimates and

flagged "J/UJ". Due to an LCS recovery of 42%, all uranium-238 (alpha spec) results were qualified as estimates and flagged "J/UJ". Due to RPDs outside QC limits, all samples results for the following analytes were qualified as estimates and flagged "J/UJ": K-40, Ra-224/226/228. Data flagged 'J' is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-96-22, Rev. 1, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, May 1998.

Appendix 1
Glossary of Data Reporting Qualifiers

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Qualifiers which may be applied by data validators in compliance with the BHI statement of work are as follows:

- U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.
- UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.
- J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.
- R - Indicates the compound or analyte was analyzed for, detected, and due to an identified QC deficiency, the data are unusable.
- UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified QC deficiency.

Appendix 2

Summary of Data Qualification

000003

DATA QUALIFICATION SUMMARY

SDG: W02330	REVIEWER: TLI	DATE: 08/10/98	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Pu-238	J	BONTK3, BONTK8	Blank contamination
Pu-238	U	BONTK6	Blank contamination
Pu-239/40	J	BONTK3, BONTK4, BONTK5, BONTK6, BONTK7, BONTK9	Blank contamination
Ra-224	J	BONTK3, BONTK4	Blank contamination
Ra-226	J	All	Blank contamination
Pu-239/40	J/UJ	All	LCS recovery
U-238 (Alpha Spec)	J/UJ	All	LCS recovery
K-40	J/UJ	All	RPD
Ra-224	J/UJ	All	RPD
Ra-226	J/UJ	All	RPD
Ra-228	J/UJ	All	RPD

000009

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

100

N/A = Not Applicable

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: 80426101 MATRIX: SOIL
CLIENT ID: BONKT3 DATE RECEIVED: 4/15/1998 1:50:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA7106
AM-241	1.17E-01	<i>U</i>	5.4E-02	5.8E-02	2.50E-02	pCi/g	79.80%	RICHRC5057
U-234	3.30E-01	<i>U</i>	8.4E-02	9.9E-02	2.14E-02	pCi/g	79.70%	RICHRC5030
U-235	1.02E-02	U	1.5E-02	1.5E-02	2.14E-02	pCi/g	79.70%	RICHRC5030
U-238	2.97E-01	<i>U</i>	8.0E-02	9.3E-02	2.66E-02	pCi/g	79.70%	RICHRC5030 <i>J</i>
PU-238	1.52E-02		1.5E-02	1.5E-02	1.03E-02	pCi/g	78.40%	RICHRC5010 <i>J</i>
PU239/40	9.81E-02		3.9E-02	4.1E-02	1.90E-02	pCi/g	78.40%	RICHRC5010 <i>J</i>
AM-241	1.05E-02	U	1.9E-02	1.9E-02	3.15E-02	pCi/g	N/A	RICHRC5017
CO-60	-9.88E-04	U	3.9E-03	3.9E-03	6.63E-03	pCi/g	N/A	RICHRC5017
CS-137DA	-7.16E-04	U	3.1E-03	3.1E-03	5.14E-03	pCi/g	N/A	RICHRC5017
EU-152	3.08E-03	U	7.4E-03	7.4E-03	1.26E-02	pCi/g	N/A	RICHRC5017
EU-154	1.29E-02	U	1.0E-02	1.0E-02	2.00E-02	pCi/g	N/A	RICHRC5017
EU-155	5.68E-03	U	9.4E-03	9.4E-03	1.53E-02	pCi/g	N/A	RICHRC5017
K-40	3.44E+00		1.6E-01	3.8E-01	N/A	pCi/g	N/A	RICHRC5017 <i>J</i>
RA-224DA	9.57E-02		1.1E-02	1.4E-02	N/A	pCi/g	N/A	RICHRC5017 <i>J</i>
RA-226	7.21E-02	<i>U</i>	1.7E-02	1.9E-02	N/A	pCi/g	N/A	RICHRC5017 <i>J</i>
RA-228	1.15E-01	<i>U</i>	2.4E-02	2.6E-02	N/A	pCi/g	N/A	RICHRC5017 <i>J</i>
U-238	2.56E-01		2.0E-01	2.0E-01	N/A	pCi/g	N/A	RICHRC5017

Number of Results: 18

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8/7/98

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: 80426102 MATRIX: SOIL
CLIENT ID: B0NKT4 DATE RECEIVED: 4/15/1998 1:50:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
AM-241	-3.61E-04	U	7.2E-04	7.2E-04	1.81E-02	pCi/g	84.10%	RICHRC5057
U-234	3.15E-01	U	8.8E-02	1.0E-01	3.86E-02	pCi/g	75.20%	RICHRC5030
U-235	2.21E-02	U	2.4E-02	2.4E-02	3.21E-02	pCi/g	75.20%	RICHRC5030
U-238	3.60E-01	U	9.3E-02	1.1E-01	2.74E-02	pCi/g	75.20%	RICHRC5030 J
PU-238	1.64E-02	U	2.3E-02	2.3E-02	2.21E-02	pCi/g	40.40%	RICHRC5010
PU239/40	6.48E-02		4.6E-02	4.8E-02	3.29E-02	pCi/g	40.40%	RICHRC5010 J
AM-241	1.65E-02	U	2.1E-02	2.1E-02	3.54E-02	pCi/g	N/A	RICHRC5017
CO-60	-9.16E-04	U	4.7E-03	4.7E-03	7.82E-03	pCi/g	N/A	RICHRC5017
CS-137DA	-2.10E-03	U	4.7E-03	4.7E-03	7.41E-03	pCi/g	N/A	RICHRC5017
EU-152	4.85E-03	U	1.2E-02	1.2E-02	2.12E-02	pCi/g	N/A	RICHRC5017
EU-154	1.06E-02	U	1.6E-02	1.6E-02	2.92E-02	pCi/g	N/A	RICHRC5017
EU-155	7.26E-03	U	1.5E-02	1.5E-02	2.36E-02	pCi/g	N/A	RICHRC5017
K-40	4.73E+00		2.5E-01	5.4E-01	N/A	pCi/g	N/A	RICHRC5017 J
RA-224DA	1.26E-01		1.6E-02	2.0E-02	N/A	pCi/g	N/A	RICHRC5017 J
RA-226	1.39E-01		1.9E-02	2.4E-02	N/A	pCi/g	N/A	RICHRC5017 J
RA-228	1.72E-01	U	3.8E-02	4.2E-02	N/A	pCi/g	N/A	RICHRC5017 J
U-238	3.07E-01	U	1.9E-01	1.9E-01	3.18E-01	pCi/g	N/A	RICHRC5017

Number of Results: 18

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8/7/98

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: 80426103 MATRIX: SOIL
CLIENT ID: BONKTS DATE RECEIVED: 4/15/1998 1:50:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
ME EXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA719G
AM-241	1.23E-02	U	1.4E-02	1.4E-02	1.11E-02	pCi/g	95.90%	RICHRC5057
U-234	5.91E-01	U	1.1E-01	1.4E-01	2.75E-02	pCi/g	85.10%	RICHRC5030
U-235	2.94E-02	U	2.6E-02	2.6E-02	3.53E-02	pCi/g	85.10%	RICHRC5030
U-238	6.49E-01	U	1.1E-01	1.5E-01	2.88E-02	pCi/g	85.10%	RICHRC5030 J
PU-238	5.57E-03	U	1.5E-02	1.5E-02	3.65E-02	pCi/g	45.80%	RICHRC5010
PU239/40	1.81E-01		7.3E-02	8.0E-02	3.65E-02	pCi/g	45.80%	RICHRC5010 J
AM-241	1.91E-02	U	7.5E-02	7.5E-02	1.16E-01	pCi/g	N/A	RICHRC5017
CO-60	1.17E-02	U	6.7E-03	6.8E-03	1.28E-02	pCi/g	N/A	RICHRC5017
CS-137DA	-1.55E-03	U	7.0E-03	7.0E-03	1.09E-02	pCi/g	N/A	RICHRC5017
EU-152	3.81E-03	U	1.7E-02	1.7E-02	2.90E-02	pCi/g	N/A	RICHRC5017
EU-154	-1.12E-02	U	2.5E-02	2.5E-02	4.01E-02	pCi/g	N/A	RICHRC5017
EU-155	-9.54E-03	U	2.4E-02	2.4E-02	3.91E-02	pCi/g	N/A	RICHRC5017
K-40	8.24E+00		3.1E-01	8.8E-01	N/A	pCi/g	N/A	RICHRC5017 J
RA-224DA	4.68E-01		2.1E-02	5.1E-02	N/A	pCi/g	N/A	RICHRC5017 J
RA-226	2.92E-01		2.5E-02	3.8E-02	N/A	pCi/g	N/A	RICHRC5017 J
RA-228	4.38E-01		6.1E-02	7.5E-02	N/A	pCi/g	N/A	RICHRC5017 J
U-238	4.34E-01	U	5.1E-01	5.1E-01	8.03E-01	pCi/g	N/A	RICHRC5017

Number of Results: 18

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8/1/98

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: 80426104 MATRIX: SOIL
CLIENT ID: B0NKT6 DATE RECEIVED: 4/15/1998 1:50:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
AM-241	5.09E-03	U	1.0E-02	1.0E-02	1.38E-02	pCi/g	74.70%	RICHRC5057
U-234	5.04E-01	U	1.1E-01	1.3E-01	3.11E-02	pCi/g	76.80%	RICHRC5030
U-235	1.72E-02	U	2.2E-02	2.2E-02	3.89E-02	pCi/g	76.80%	RICHRC5030
U-238	6.25E-01	U	1.2E-01	1.6E-01	2.93E-02	pCi/g	76.80%	RICHRC5030
PU-238	3.56E-03	U	3.2E-03	3.2E-03	5.01E-02	pCi/g	45.60%	RICHRC5010
PU239/40	1.68E-01		7.7E-02	8.4E-02	2.40E-02	pCi/g	45.60%	RICHRC5010
AM-241	-7.88E-03	U	7.3E-02	7.3E-02	1.16E-01	pCi/g	N/A	RICHRC5017
CO-60	-4.35E-03	U	6.9E-03	6.9E-03	1.09E-02	pCi/g	N/A	RICHRC5017
CS-137DA	-3.34E-03	U	6.0E-03	6.0E-03	9.97E-03	pCi/g	N/A	RICHRC5017
EU-152	1.22E-02	U	1.7E-02	1.7E-02	3.00E-02	pCi/g	N/A	RICHRC5017
EU-154	6.71E-03	U	2.5E-02	2.5E-02	4.18E-02	pCi/g	N/A	RICHRC5017
EU-155	3.07E-02	U	2.4E-02	2.4E-02	4.06E-02	pCi/g	N/A	RICHRC5017
K-40	8.26E+00		3.0E-01	8.8E-01	N/A	pCi/g	N/A	RICHRC5017
RA-224DA	4.44E-01		2.0E-02	4.9E-02	N/A	pCi/g	N/A	RICHRC5017
RA-226	2.82E-01		2.4E-02	3.7E-02	N/A	pCi/g	N/A	RICHRC5017
RA-228	4.58E-01		5.6E-02	7.2E-02	N/A	pCi/g	N/A	RICHRC5017
U-238	5.63E-01	U	4.9E-01	4.9E-01	8.05E-01	pCi/g	N/A	RICHRC5017

Number of Results: 18

Handwritten: 8/7/98

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: 80426105 MATRIX: SOIL
CLIENT ID: B0NKT7 DATE RECEIVED: 4/15/1998 1:50:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA7196
AM-241	1.70E-02	U	1.7E-02	1.7E-02	1.15E-02	pCi/g	92.20%	RICHRC5057
U-234	6.67E-01	U	1.4E-01	1.8E-01	4.27E-02	pCi/g	62.70%	RICHRC5030
U-235	1.87E-02	U	2.5E-02	2.5E-02	4.07E-02	pCi/g	62.70%	RICHRC5030
U-238	6.69E-01	U	1.4E-01	1.8E-01	3.29E-02	pCi/g	62.70%	RICHRC5030J
PU-238	2.26E-02	U	2.7E-02	2.7E-02	3.12E-02	pCi/g	51.80%	RICHRC5010
PU239/40	9.95E-02		5.6E-02	5.9E-02	3.54E-02	pCi/g	51.80%	RICHRC5010J
AM-241	8.16E-03	U	4.3E-02	4.3E-02	6.67E-02	pCi/g	N/A	RICHRC5017
CO-60	1.29E-02	U	7.2E-03	7.3E-03	1.40E-02	pCi/g	N/A	RICHRC5017
CS-137DA	7.22E-03	U	7.0E-03	7.0E-03	1.23E-02	pCi/g	N/A	RICHRC5017
EU-152	1.12E-02	U	1.7E-02	1.7E-02	2.93E-02	pCi/g	N/A	RICHRC5017
EU-154	1.35E-02	U	2.6E-02	2.6E-02	4.44E-02	pCi/g	N/A	RICHRC5017
EU-155	3.02E-02	U	2.1E-02	2.1E-02	3.42E-02	pCi/g	N/A	RICHRC5017
K-40	8.69E+00		3.3E-01	9.3E-01	N/A	pCi/g	N/A	RICHRC5017J
RA-224DA	4.61E-01		2.2E-02	5.1E-02	N/A	pCi/g	N/A	RICHRC5017J
RA-226	3.15E-01		3.4E-02	4.6E-02	N/A	pCi/g	N/A	RICHRC5017J
RA-228	4.44E-01		6.0E-02	7.4E-02	N/A	pCi/g	N/A	RICHRC5017J
U-238	1.93E-01		4.2E-01	4.2E-01	N/A	pCi/g	N/A	RICHRC5017

Number of Results: 18

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: 80426106 MATRIX: SOIL
CLIENT ID: B0NKT8 DATE RECEIVED: 4/15/1998 1:50:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHO NUMBEE
HEXCHROME	3.00E-02	U	N/A	N/A	3.00E-02	mg/kg	N/A	EPA741
AM-241	4.97E-02		3.1E-02	3.2E-02	1.35E-02	pCi/g	80.10%	RICHRCE
U-234	5.09E-01		1.0E-01	1.3E-01	3.73E-02	pCi/g	80.90%	RICHRCE
U-235	4.64E-02		3.3E-02	3.3E-02	3.73E-02	pCi/g	80.90%	RICHRCE
U-238	5.06E-01		1.0E-01	1.3E-01	3.18E-02	pCi/g	80.90%	RICHRCE
PU-238	2.75E-02		2.5E-02	2.5E-02	2.25E-02	pCi/g	75.90%	RICHRCE
PU239/40	3.75E-01		9.2E-02	1.1E-01	1.51E-02	pCi/g	75.90%	RICHRCE
AM-241	-6.54E-03	U	2.8E-02	2.8E-02	4.45E-02	pCi/g	N/A	RICHRCE
CO-60	1.48E-02	U	6.6E-03	6.8E-03	1.31E-02	pCi/g	N/A	RICHRCE
CS-137DA	2.75E-03	U	6.4E-03	6.5E-03	1.07E-02	pCi/g	N/A	RICHRCE
EU-152	2.11E-02	U	1.6E-02	1.6E-02	2.83E-02	pCi/g	N/A	RICHRCE
EU-154	1.92E-02	U	2.2E-02	2.2E-02	3.93E-02	pCi/g	N/A	RICHRCE
EU-155	4.24E-02	U	2.1E-02	2.1E-02	3.39E-02	pCi/g	N/A	RICHRCE
K-40	8.52E+00		3.3E-01	9.2E-01	N/A	pCi/g	N/A	RICHRCE
RA-224DA	4.18E-01		2.1E-02	4.7E-02	N/A	pCi/g	N/A	RICHRCE
RA-226	3.04E-01		3.0E-02	4.3E-02	N/A	pCi/g	N/A	RICHRCE
RA-228	4.10E-01		5.2E-02	6.6E-02	N/A	pCi/g	N/A	RICHRCE
U-238	1.33E-01	U	2.4E-01	2.4E-01	3.85E-01	pCi/g	N/A	RICHRCE

Number of Results: 18

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8/7/98

SAMPLE RESULTS

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: 80426107 MATRIX: SOIL
CLIENT ID: B0NKT9 DATE RECEIVED: 4/15/1998 1:50:00 PM

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
✓ W-HEXCHROME	3.80E-02	U	N/A	N/A	3.80E-02	mg/kg	N/A	EPA7136
AM-241	6.53E-03	U	1.4E-02	1.4E-02	2.86E-02	pCi/g	77.80%	RICHRC5J57
U-234	6.41E-01	✓	1.2E-01	1.6E-01	2.89E-02	pCi/g	72.60%	RICHRC5J30
U-235	3.01E-02	U	2.9E-02	2.9E-02	3.98E-02	pCi/g	72.60%	RICHRC5J30
U-238	7.62E-01	✓	1.3E-01	1.8E-01	3.27E-02	pCi/g	72.60%	RICHRC5J30 J
PU-238	1.94E-02	U	2.9E-02	2.9E-02	4.07E-02	pCi/g	41.90%	RICHRC5J10
PU239/40	1.00E-01		6.4E-02	6.7E-02	4.07E-02	pCi/g	41.90%	RICHRC5J10 J
AM-241	-7.23E-02	U	8.3E-02	8.3E-02	1.30E-01	pCi/g	N/A	RICHRC5J17
CO-60	9.39E-03	U	7.3E-03	7.4E-03	1.34E-02	pCi/g	N/A	RICHRC5J17
CS-137DA	2.68E-03	U	6.9E-03	7.0E-03	1.19E-02	pCi/g	N/A	RICHRC5J17
EU-152	2.95E-02	U	1.9E-02	1.9E-02	3.35E-02	pCi/g	N/A	RICHRC5J17
EU-154	3.50E-04	U	2.6E-02	2.6E-02	4.09E-02	pCi/g	N/A	RICHRC5J17
EU-155	2.35E-02	U	2.6E-02	2.6E-02	4.42E-02	pCi/g	N/A	RICHRC5J17
K-40	8.68E+00		3.3E-01	9.3E-01	N/A	pCi/g	N/A	RICHRC5J17 J
RA-224DA	4.72E-01		2.2E-02	5.2E-02	N/A	pCi/g	N/A	RICHRC5J17 J
RA-226	2.94E-01		2.6E-02	3.9E-02	N/A	pCi/g	N/A	RICHRC5J17 J
RA-228	4.87E-01		5.9E-02	7.7E-02	N/A	pCi/g	N/A	RICHRC5J17 J
U-238	3.80E-02	U	5.3E-01	5.3E-01	8.48E-01	pCi/g	N/A	RICHRC5J17

Number of Results: 18

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6/17/98

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Quanterra Incorporated
2800 George Washington Way
Richland, Washington 99352

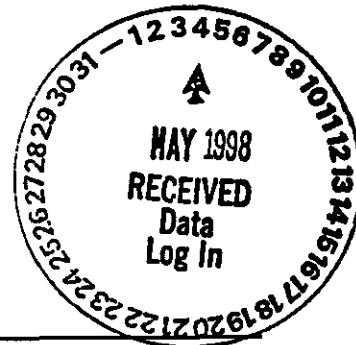
509 375-3131 Telephone
509 375-5590 Fax

CERTIFICATE OF ANALYSIS

Bechtel Hanford, Inc.
3350 George Washington Way
Richland, WA 99352

May 1, 1998

Attention: Joan Kessner



SAF Number	:	B98-022
Date SDG Closed	:	April 15, 1998
Number of Samples	:	Seven (7)
Sample Type	:	Soil
SDG Number	:	W02330
Data Deliverable	:	15 Day Priority/21 Day Summary

I. Introduction

On April 15, 1998, seven 15 day priority, soil samples were received by the Quanterra Environmental Services Richland Laboratory (QESRL) for radiochemical analysis. Upon receipt, the samples were assigned the following laboratory ID numbers to correspond with the Bechtel Hanford, Inc. (BHI) specific IDs:

<u>QESRL ID#</u>	<u>BHI ID#</u>	<u>MATRIX</u>	<u>DATE OF RECEIPT</u>
80426101	BONKT3	Soil	4/15/98
80426102	BONKT4	Soil	4/15/98
80426103	BONKT5	Soil	4/15/98
80426104	BONKT6	Soil	4/15/98
80426105	BONKT7	Soil	4/15/98
80426106	BONKT8	Soil	4/15/98
80426107	BONKT9	Soil	4/15/98

II. Analytical Results/Methodology

The analytical results for this report are presented by laboratory sample ID. Each set of data includes sample identification information, analytical results and the appropriate associated statistical errors.

Bechtel Hanford, Inc.
May 1, 1998
Page 2

The requested analyses were:

Alpha Spectroscopy

Americium-241 by method RICH-RC-5057

Plutonium-238, -239/40 by method RICH-RC-5057

Uranium-234, -235, -238 by method RICH-RC-5030

Gamma Spectroscopy

Gamma Scan by method RICH-RC-5017

Chemical Analyses

Chromium Hex by EPA method 7196

III. Quality Control

The samples analyzed under SDG W02330 were processed as quick turn samples and had two Laboratory Control Samples (LCS and LCS duplicate) and one method (reagent) blank analyzed with the batch. Any exceptions have been noted in the "Comments" section.

Quality control sample results are reported in the same units as sample results.

IV. Comments

Alpha Spectroscopy

Americium-241 by method RICH-RC-5057

The LCS, batch blank, sample duplicate (BONKT3) and sample results are within contractual requirements. Thorium-228 was present in samples BONKT3, BONKT4, BONKT5 and BONKT6, therefore, the 85 % abundant peak for Am-241 at 5486 KEV was analyzed but the thorium-228 region of interest was not analyzed since it would have interfered with the americium region of interest.

Plutonium-238, -239/40 by method RICH-RC-5010

The LCS, batch blank, sample duplicate (BONKT3) and sample results are within contractual requirements. The LCS had a high bias of 139.6% recovery. Since the bias met the second level of the evaluation criteria, you gave approval to report the data.

Uranium-234, -235, -238 by method RICH-RC-5030

The LCS, batch blank, sample duplicate (BONKT3) and sample results are within contractual requirements.

Bechtel Hanford, Inc.
May 1, 1998
Page 3

Gamma Spectroscopy

Gamma Scan by method RICH-RC-5017

The LCS, batch blank, sample duplicate (B0NKT3) and sample results are within contractual requirements.

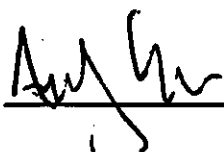
Chemical Analyses

Chromium Hex by EPA method 7196

The LCS, batch blank, sample duplicate (B0NKT7) and sample results are within contractual requirements. The MS/MSD (B0NKT7) had low recoveries due to matrix interference.

I certify that this Certificate of Analysis is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:



Andy Kopriva
Project Manager

Collector Mike Stankovich / <i>ISRYANT</i>	Company/Contact Gary Hamilton	Telephone No. 531-0731	Project Coordinator KIDNER, CC	Data Turnaround 15 Days						
Project Designation 100 D Areas - Full Protocol	Sampling Location 1607-D2	SAF No. D98-022								
Ice Chest No.	Field Logbook No. EL-1339-2	Method of Shipment Hand Delivery - Government Vehicle								
Shipped To Quanterra Incorporated	Offsite Property No. N/A	Bill of Lading/Air Bill No. N/A								
POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	Cool AC	None	None	None	Cool AC	Cool AC	None	
	Type of Container	P	uG	uG	uG	uG	uG	uG	P	
	No. of Container(s)	1	1	1	1	1	1	1	2	
Special Handling and/or Storage	Volume	20ml	60ml	60ml	60ml	60ml	120ml	120ml	1000ml	

SAMPLE ANALYSIS

SDG

W02330

804260

804260

Sample No.	Matrix *	Sample Date	Sample Time	Ambly Ion	Chromium Hex - 7198	Americium- 241; Isotope Plutonium; Isotope Uranium	See Item (1) in Special Instructions	Mercury - 7471 - (CV)	Polychlorinated Biphenyls (PCBs) 8000 (TCL)	Isotopic VOA - 6378A (TCL) (Bis(2- ethylhexyl) phthalate)	See Item (2) in Special Instructions		
ONKT3 01	Soil	4-15-98	0805	X	X	X	X ⁸	X ⁸	X ⁸	X ⁸	X	Eg. 1	1
ONKT4 02	Soil	4-15-98	0820	X	X	X	X ⁶	X ⁶	X ⁶	X ⁶	X	E.W.	2
ONKT8 03	Soil	4-15-98	0845	X	X	X	X ⁶	X ⁶	X ⁶	X ⁶	X	A2	3
ONKT8 04	Soil	4-15-98	0845	X	X	X	X ⁸	X ⁸	X ⁸	X ⁸	X	A2	4
							100	100	100	100			

CHAIN OF POSSESSION

Sign/Print Names

1350

Received By <i>Tom B...</i>	Date/Time 4-15-98	Received By <i>Stadelberg</i>	Date/Time 4/15/98
Received By	Date/Time	Received By <i>L. Cooper</i>	Date/Time
Received By	Date/Time	Received By	Date/Time
Received By	Date/Time	Received By	Date/Time

SPECIAL INSTRUCTIONS

COA - R607D2 2F00

- (1) ICP Metals - 6018A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Silver)
 (2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

Matrix *

- S - Soil
- SE - Sediment
- SO - Solid
- SL - Sludge
- W - Water
- O - Oil
- A - Air
- DS - Drum Solids
- DL - Drum Liquids
- T - Tissue
- WI - Wipe
- L - Liquid
- V - Vegetation
- X - Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Collector Mike Stankovich / <i>BRYANT</i>	Company Contact Gary Hamilton	Telephone No. 531-0731	Project Coordinator KOERNER, CC	Data Turnaround 15 Days							
Project Designation 100 D Areas - Full Protocol	Sampling Location 1607-D2	SAF No. B98-022									
Case Chest No.	Field Logbook No. EL-1339-2	Method of Shipment Hand Delivery - Government Vehicle									
Shipped To Quanterra Incorporated	Offsite Property No. N/A	Bill of Lading/Air Bill No. N/A									
POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	Cool 4C	None	None	None	Cool 4C	Cool 4C	None		
	Type of Container	P	oG	oG	oG	oG	oG	oG	P		
	No. of Container(s)	1	1	1	1	1	1	1	2		
Special Handling and/or Storage	Volume	20ml	60ml	60ml	60ml	60ml	120ml	120ml	1000ml		

SAMPLE ANALYSIS

804260

Activity Seen	Chromium Hex - 7106	Americium-241; Isotope Plutonium; Isotope Uranium	See Item (1) in Special Instructions.	Mercury - 7471 - (CV)	P.A.P.C.M. - 8086 (TCL)	Send-VOA - 8276A (TCL) (Bic(2), styrene/g phthalate)	See Item (2) in Special Instructions.
	804261					804261	

Sample No.	Matrix *	Sample Date	Sample Time										
NKKT7 05	Soil	4-15-98	0905	Y	X	X	Y 8 ⁰	X 6 ⁰	X 8 ⁰	X 8 ⁰	Y	A4	X5
NKKT8 06	Soil	4-15-98	0915	X	X	X	X 6 ⁰	X 6 ⁰	X	X	X	A3	A6
NKKT9 07	Soil	4-15-98	0930	X	X	X	X 6 ⁰	X 6 ⁰	X	X	X	A1	B2
							X 8 ⁰	X 8 ⁰	X	X			
							X 8 ⁰	X 8 ⁰	X	X			
							X 8 ⁰	X 8 ⁰	X	X			
							X 8 ⁰	X 8 ⁰	X	X			
							X 8 ⁰	X 8 ⁰	X	X			
							X 8 ⁰	X 8 ⁰	X	X			
							X 8 ⁰	X 8 ⁰	X	X			

CHAIN OF POSSESSION		Sign/Print Names		1350		SPECIAL INSTRUCTIONS COA - R687D2 2P00				Matrix *	
Collected By	Date/Time	Received By	Date/Time	(1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Silver) (2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)				S - Soil SS - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air DS - Drum Solids DL - Drum Liquids T - Tissue WL - Wipe L - Liquid V - Vegetation X - Other			
Collected By	Date/Time	Received By	Date/Time								
Collected By	Date/Time	Received By	Date/Time								
Collected By	Date/Time	Received By	Date/Time								
LABORATORY SECTION	Received By	Title				Date/Time					
VAL. SAMPLE DISPOSITION	Disposal Method	Disposed By				Date/Time					

Appendix 5
Data Validation Supporting Documentation

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 100 D areas			DATA PACKAGE: W02330		
VALIDATOR: TLJ		LAB: QES		DATE: 8/4/98	
CASE:			SDG: W02330		
ANALYSES PERFORMED					
<input type="checkbox"/> Gross Alpha/Beta	<input type="checkbox"/> Strontium-90	<input type="checkbox"/> Technetium-99	<input checked="" type="checkbox"/> Alpha Spectroscopy	<input checked="" type="checkbox"/> Gamma Spectroscopy	
<input type="checkbox"/> Total Uranium	<input type="checkbox"/> Radium-22	<input type="checkbox"/> Tritium	<input type="checkbox"/>		
SAMPLES/MATRIX					
BONKT3, BONKT4, BONKT5, BONKT6					
BONKT7, BONKT8, BONKT9					
soil					

1. Completeness ~~N/A~~

Technical verification forms present? Yes No N/A

Comments: _____

2. Initial Calibration ~~N/A~~Instruments/detectors calibrated within
one year of sample analysis? Yes No N/A

Initial calibration acceptable? Yes No N/A

Standards NIST traceable? Yes No N/A

Standards Expired? Yes No N/A

Comments: _____

A-1

000026

3. Continuing Calibration ☒ N/A

Calibration checked within one week of sample analysis? . . . Yes No N/A
 Calibration check acceptable? Yes No N/A
 Calibration check standards NIST traceable? Yes No N/A
 Calibration check standards expired? Yes No N/A

Comments: _____

4. Blanks ☐ N/A

Method blank analyzed? ☒ Yes ☐ No N/A
 Method blank results acceptable? Yes ☒ No N/A
 Analytes detected in method blank? ☒ Yes ☐ No N/A
 Field blank(s) analyzed? ☒ Yes ☐ No N/A
 Field blank results acceptable? Yes ☒ No N/A
 Analytes detected in field blank(s)? ☒ Yes ☐ No N/A
 Transcription/Calculation Errors? Yes No ☒ N/A

Comments: PU 238 PU 239/40 RA 224 in blank

PU 238 T3, T8 - J T6 - to 0.0501 U T3+T4 J

PU 239/40 T3, T4, T5, T6, T7, T9 - J

RA 224 FF all J

AM 241 FB/ES AM 241, U-234/38 PU 238-239/40 K40 (RA-224/26/28 U-238/GFA)

5. Matrix Spikes ☒ N/A

Matrix spike analyzed? Yes No N/A
 Spike recoveries acceptable? Yes No N/A
 Spike source traceable? Yes No N/A
 Spike source expired? Yes No N/A
 Transcription/Calculation Errors? Yes No N/A

Comments: _____

A2

6. Laboratory Control Samples ☐ N/A

LCS analyzed? Yes No N/A

LCS recoveries acceptable? Yes No N/A

LCS traceable? Yes No N/A

Transcription/Calculation Errors? Yes No N/A

Comments: P0 239/40 13990
U-239 4270

7. Chemical Recovery ☐ N/A

Chemical carrier added? Yes No N/A

Chemical recovery acceptable? Yes No N/A

Chemical carrier traceable? Yes No N/A

Chemical carrier expired? Yes No N/A

Transcription/Calculation errors? Yes No N/A

Comments: _____

8. Duplicates ☐ N/A

Duplicates Analyzed? Yes No N/A

RPD Values Acceptable? Yes No N/A

Transcription/Calculation Errors? Yes No N/A

Comments: ~~AM241-103.4 / P0239 99 / R0239-175 / AM241-145~~

~~CA20-122 / CA20-122 / R0239-4479 / R0239-45 / R0239-39 / R0239-40~~

RA224 47 / RA224-30.21 / ~~RA224-37~~ J/JJ 7

AJK

9. Field QC Samples ☐ N/A

Field duplicate sample(s) analyzed? Yes No N/A
 Field duplicate RPD values acceptable? Yes No N/A
 Field split sample(s) analyzed? Yes No N/A
 Field split RPD values acceptable? Yes No N/A
 Performance audit sample(s) analyzed? Yes No N/A
 Performance audit sample results acceptable? Yes No N/A

Comments: _____

10. Holding Times

Are sample holding times acceptable? Yes No N/A

Comments: _____

11. Results and Detection Limits (Levels D & E) ☐ N/A

Results reported for all required sample analyses? Yes No N/A
 Results supported in raw data? Yes No N/A
 Results Acceptable? Yes No N/A
 Transcription/Calculation errors? Yes No N/A
 MDA's meet required detection limits? Yes No N/A
 Transcription/calculation errors? Yes No N/A

Comments: U-238 T4 T5 T6 T8 T9

Am 241 T5 T6 T9

ask

DUPLICATE RESULTS

LAB NAME: QUANTERRA, Richland **SDG: /RPT GRP:** W02330 / 5017
LAB SAMPLE ID: D0426101 **MATRIX:** SOIL
CLIENT ID: B0NKT3 **DATE RECEIVED:** 4/15/1998 1:50:00 P
ORIG LAB SAMPLE ID: 80426101

ANALYTE	DUP RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	METHOD NUMBER	ORIG RESULT	RPD
AM-241	3.74E-02	J	3.5E-02	3.5E-02	3.53E-02	pCi/g	71.20%	RICHRC5057	1.17E-01	103.39%
U-234	2.95E-01	J	7.9E-02	9.2E-02	2.64E-02	pCi/g	76.70%	RICHRC5030	3.30E-01	11.17%
U-235	1.38E-02	U	1.8E-02	1.9E-02	2.99E-02	pCi/g	76.70%	RICHRC5030	1.02E-02	29.40%
U-238	3.11E-01	J	8.1E-02	9.5E-02	2.64E-02	pCi/g	76.70%	RICHRC5030	2.97E-01	4.53%
PU-238	5.13E-03	U	1.1E-02	1.1E-02	2.24E-02	pCi/g	54.80%	RICHRC5010	1.52E-02	99.28%
PU239/40	5.57E-03	U	1.1E-02	1.1E-02	1.51E-02	pCi/g	54.80%	RICHRC5010	9.81E-02	178.50%
AM-241	-7.97E-03	U	2.2E-02	2.2E-02	3.53E-02	pCi/g	N/A	RICHRC5017	1.05E-02	1455.12%
CO-60	-4.18E-03	U	5.1E-03	5.1E-03	8.33E-03	pCi/g	N/A	RICHRC5017	-9.88E-04	123.53%
CS-137DA	-4.06E-03	U	5.0E-03	5.0E-03	7.71E-03	pCi/g	N/A	RICHRC5017	-7.16E-04	140.03%
EU-152	-3.34E-03	U	1.2E-02	1.2E-02	2.06E-02	pCi/g	N/A	RICHRC5017	3.08E-03	4899.24%
EU-154	2.53E-02	U	1.6E-02	1.6E-02	3.12E-02	pCi/g	N/A	RICHRC5017	1.29E-02	65.13%
EU-155	5.18E-03	U	1.5E-02	1.5E-02	2.41E-02	pCi/g	N/A	RICHRC5017	5.68E-03	9.18%
K-40	5.14E+00		2.6E-01	5.8E-01	N/A	pCi/g	N/A	RICHRC5017	3.44E+00	39.68%
RA-224DA	1.43E-01		1.4E-02	2.0E-02	N/A	pCi/g	N/A	RICHRC5017	9.57E-02	39.91%
RA-226	1.17E-01		2.2E-02	2.5E-02	N/A	pCi/g	N/A	RICHRC5017	7.21E-02	47.86%
RA-228	1.56E-01	J	3.7E-02	4.0E-02	N/A	pCi/g	N/A	RICHRC5017	1.15E-01	30.21%
U-238	1.75E-01	U	1.8E-01	1.9E-01	3.05E-01	pCi/g	N/A	RICHRC5017	2.56E-01	37.38%

Number of Results: 17

BLANK RESULTS

LAB NAME: QUANTERRA, Richland SDG /RPT GRP: W02330 / 5017
LAB SAMPLE ID: J042611B MATRIX: SOIL

ANALYTE	RESULT	Q	COUNTING ERROR (2s)	TOTAL ERROR (2s)	MDA/IDL	REPORT UNIT	YIELD	METHOD NUMBER
HEXCHROME	1.00E-03	U	N/A	N/A	2.00E-03	mg/L	N/A	EPA7196
AM-241	1.80E-02	J	1.8E-02	1.8E-02	1.22E-02	pCi/g	87.50%	RICHRC5057
U-234	2.09E-03	U	9.7E-03	9.7E-03	2.94E-02	pCi/g	87.20%	RICHRC5030
U-235	-7.59E-04	U	1.1E-03	1.1E-03	2.17E-02	pCi/g	87.20%	RICHRC5030
U-238	-1.90E-03	U	1.7E-03	1.7E-03	2.68E-02	pCi/g	87.20%	RICHRC5030
PU-238	2.08E-02		2.1E-02	2.1E-02	1.41E-02	pCi/g	60.50%	RICHRC5010
PU239/40	5.68E-02		3.5E-02	3.6E-02	2.09E-02	pCi/g	60.50%	RICHRC5010
AM-241	-3.75E-03	U	1.4E-02	1.4E-02	2.30E-02	pCi/g	N/A	RICHRC5017
CO-60	-1.91E-03	U	4.0E-03	4.0E-03	6.74E-03	pCi/g	N/A	RICHRC5017
CS-137DA	-1.86E-03	U	3.6E-03	3.6E-03	5.86E-03	pCi/g	N/A	RICHRC5017
EU-152	-7.49E-03	U	9.7E-03	9.7E-03	1.57E-02	pCi/g	N/A	RICHRC5017
EU-154	1.15E-02	U	9.2E-03	9.3E-03	2.03E-02	pCi/g	N/A	RICHRC5017
EU-155	7.17E-03	U	1.0E-02	1.0E-02	1.67E-02	pCi/g	N/A	RICHRC5017
K-40	1.61E-01	U	6.3E-02	6.5E-02	1.36E-01	pCi/g	N/A	RICHRC5017
RA-224DA	3.46E-02		9.4E-03	1.0E-02	N/A	pCi/g	N/A	RICHRC5017
RA-226	7.51E-02	J	1.4E-02	1.6E-02	N/A	pCi/g	N/A	RICHRC5017
RA-228	5.13E-02	U	1.9E-02	2.0E-02	3.97E-02	pCi/g	N/A	RICHRC5017
U-238	1.42E-01	U	1.2E-01	1.3E-01	2.19E-01	pCi/g	N/A	RICHRC5017

Number of Results: 18

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland SDG: /RPT GRP: W02330 / 5017
LAB SAMPLE ID: J042611S MATRIX: SOIL

ANALYTE	RESULT	Q	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA/ IDL	REPORT UNIT	YIELD	EXPECTED	RECOVER
HEXCHROME	4.88E-01		N/A	N/A	2.00E-03	mg/L	N/A	5.00E-01	97.60%
AM-241	4.21E+00	J	2.7E-01	6.7E-01	1.69E-02	pCi/g	99.90%	4.52E+00	93.23%
U-234	1.74E+00		1.9E-01	3.3E-01	3.05E-02	pCi/g	79.30%	1.62E+00	107.59%
U-235	9.23E-02	J	4.4E-02	4.6E-02	2.07E-02	pCi/g	79.30%	7.37E-02	125.20%
U-238	1.62E+00		1.8E-01	3.1E-01	2.35E-02	pCi/g	79.30%	1.69E+00	95.52%
PU239/40	4.74E+00		3.3E-01	7.0E-01	1.54E-02	pCi/g	55.80%	3.39E+00	139.61%
CS-137DA	2.97E-01		3.0E-02	4.2E-02	N/A	pCi/g	N/A	3.20E-01	92.77%
K-40	1.83E+01		7.6E-01	2.0E+00	N/A	pCi/g	N/A	1.95E+01	93.71%
RA-226	9.84E-01		8.7E-02	1.3E-01	N/A	pCi/g	N/A	1.15E+00	85.23%
RA-228	1.86E+00		1.6E-01	2.4E-01	N/A	pCi/g	N/A	1.87E+00	99.20%
U-238	4.48E-01	U	8.2E-01	8.2E-01	1.33E+00	pCi/g	N/A	1.05E+00	42.58%

Number of Results: 11

Bechtel Hanford, Inc.
3350 George Washington Way
Richland, WA 99352

Attn: BHI Sample Management
MO-105/300 Area
MSIN: L0-20
Phone: 373-5665
FAX: 373-6725

BHI Sample Management

Fax

To: Bruce Christian From: Jeanette Duncan
Fax: 375-5151 Pages: 4
Phone: _____ Date: 8/25/98
Re: _____ CC: _____

☐ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

• Comments:

B- Please look at Blumenkranz's comments -
any questions - call Rich Weiss on 373-5673.
J

Review Comment Record (RCR)	1. Date 8/25/98	2. Review No. BHI/QA98007
	3. Project 107-D	4. Page Page 1 of 1

5. Document Number(s)/Title(s) W02330-QES (SDG No. W02330)	6. Program/Project/ Building Number 107-D – Soil	7. Reviewer Claude Stacey	8. Organization/Group BHI/QA	9. Location/Phone H0-16/372-9208
---	--	------------------------------	---------------------------------	-------------------------------------

17. Comment Submittal Approval: 10. Agreement with indicated comment disposition(s) 11. CLOSED

Organization Manager (Optional)

Date

Reviewer/Point of Contact

Date

Reviewer/Point of Contact

Author/Originator

Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	Radiochemistry – page 009, under Samples Affected the sample numbers are wrong. They should be B0NKT- not B0NTK-.			
2				
3				

Review Comment Record (RCR)	1. Date 8/25/98	2. Review No. BHI/QA98006
	3. Project 107-D	4. Page Page 1 of 1

5. Document Number(s)/Title(s) W02386-QES (SDG No. W02386)	6. Program/Project/ Building Number 107-D – Soil	7. Reviewer Claude Stacey	8. Organization/Group BHI/QA	9. Location/Phone H0-16/372-9208
---	--	------------------------------	---------------------------------	-------------------------------------

17. Comment Submittal Approval:

10. Agreement with indicated comment disposition(s)

11. CLOSED

Organization Manager (Optional)

Date

Reviewer/Point of Contact

Date

Reviewer/Point of Contact

Author/Originator

Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	OK No Comment			
2				
3				

Author: David B Blumenkranz at ~BHI001
Date: 8/18/98 8:03 AM
Priority: Normal
TO: Jeanette M Duncan at ~BHI012
CC: Mark H Sturges
Subject: Comments on the 107-D2 & 1607-D2 Validation packages.

----- Message Contents -----

My only comment is that the validator should not only look at the sample data with regards to CRDLs but also the target detection limits specified in Table II-2 of the SAP. Analyses that fail to meet the target DLs of the SAP do not require any qualification (flagging), but they need to still be addressed per the SAP. The validator need only bring to our attention those analyses that don't pass the the SAP target DLs.

We can close out the 107-D2 & 1607-D2 Validation packages, but next time, lets have the validator complete the SAP target DL comparison in addition the work that has been done to complete the 107-D2 & 1607-D2 Validation packages.

Please call me if you (or the validator) have any questions. Overall, the packages look good.

Thanks,
Dave

08/25/98

12:48

☎5093736725

BHI SAMPLE MGT

001

*** ACTIVITY REPORT ***

TRANSMISSION OK

TX/RX NO. 0079

CONNECTION TEL 3755151

CONNECTION ID

START TIME 08/25 12:47

USAGE TIME 01'39

PAGES 4

RESULT OK

Author: David B Blumenkranz at -BHI001

Date: 8/18/98 8:03 AM

Priority: Normal

TO: Jeanette M Duncan at -BHI012

CC: Mark H Sturges

Subject: Comments on the 107-D2 & 1607-D2 Validation packages.

----- Message Contents -----

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We can close out the 107-D2 & 1607-D2 Validation packages, but next time, lets have the validator complete the SAP target DL comparison in addition the work that has been done to complete the 107-D2 & 1607-D2 Validation packages.

Please call me if you (or the validator) have any questions. Overall, the packages look good.

Thanks,
Dave

Language Change
8/25/98

All accuracy results were acceptable.

- **Precision**

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the CRDL and the RPD is less than 30 percent for soil samples the results are acceptable. If either activities are less than five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

Due to an RPD of 67.5%, all uranium-238 results were qualified as estimates and flagged "UJ".

All other duplicate results were acceptable.

Field Duplicate Sample

One pair of field duplicate below:

r analysis as shown

2386

Sample No.

BONKR7

The duplicate sample determining the RPD for results were acceptable

tion guidelines for field duplicate

- **Detection Levels**

Reported laboratory detection levels are reviewed to ensure that they are at or below the project specific target detection limits. The reported detection limit for U-238 was above the target detection limit. Under the BHI statement of work, no qualification is required. All other reported MDAs were at or below the analyte-specific target detection limit.

samples with a spike recovery greater than 130% and a sample result less than the IDL, no qualification is required.

All matrix spike results were acceptable.

- **Precision**

Laboratory Duplicate Samples

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 30% for solid samples. If RPD values are out of specification and the sample concentration is greater than five times the CRDL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus two times the CRDL and the sample concentration is less than five times the CRDL, all associated sample results are qualified as estimated and flagged "J/UJ". The performance criteria for aqueous laboratory duplicates are an RPD less than 30% for positive sample results greater than five times the CRDL or plus or minus the CRDL for positive sample results less than five times the CRDL. Sample results outside the criteria are qualified as estimates and flagged "J/UJ".

All laboratory duplicate recovery results were acceptable.

Field Duplicate Samples

One pair of field duplicate samples were submitted to QES for analysis as shown below:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>
BONKR7	BONKR8

The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against project specific target detection limits (TDLs) to ensure that laboratory detection levels meet the required criteria. All reported laboratory detection levels met the analyte specific TDLs.

Field Duplicate Samples

One pair of field duplicate samples were submitted to QES for analysis as shown below:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>
BONKR7	BONKR8

The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Detection Levels**

Reported laboratory detection levels are compared against project specific target detection limits (TDLs) to ensure that laboratory detection levels meet the required criteria. The reported analytical detection level for toxaphene was above the TDLs in all samples. Under the BHI statement of work, no qualification is required. All other reported detection levels were at or below the TDLs.

- **Completeness**

Data Package No. W02386-QES (SDG No. W02386) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to MS/MSD recoveries below QC limits, all aldrin and dieldrin results were qualified as estimates and flagged "J/UJ". Data flagged 'J' is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

Field Duplicate Samples

One pair of field duplicate samples were submitted to QES for analysis as shown below:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>
BONKT5	BONKT6

The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Detection Levels**

Reported laboratory detection levels are reviewed to ensure that they are at or below the project specific target detection limits (TDLs). Reported MDAs were above the TDL for U-238 in samples BONKT4, BONKT5, BONKT6, BONKT8, and BONKT9 above for / BONKT6, and BONKT9. All other reported MI fic TDLs.

2330

- **Completeness**

Data Package No. V
verified for complete

itted for validation and

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to laboratory blank contamination, plutonium-238 results in samples BONTK3 and BONTK8 were qualified as estimates and flagged "J". Due to laboratory blank contamination, the negative plutonium-238 result in sample BONTK6 was elevated to the MDA and qualified as undetected "U". Due to laboratory blank contamination, plutonium-239/240 results in all samples (except BONKT8) were qualified as estimates and flagged "J". Due to laboratory blank contamination, radium-224 results in samples BONKT3 and BONKT4 were qualified as estimates and flagged "J". Due to laboratory blank contamination, radium-226 results in all samples were qualified as estimates and flagged "J". Due to an LCS recovery of 139%, plutonium-239/240 results in all samples were qualified as estimates and

000004

Sample No.

Duplicate Sample No.

BONKT5

BONKT6

The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Detection Levels**

Reported laboratory detection levels are compared against project specific target detection limits (TDLs) to ensure that laboratory detection levels meet the required criteria. The reported analytical detection level for toxaphene was above the TDL in all samples. Under the BHI statement of work, no qualification is required. All other reported detection levels were at or below the TDL.

- **Completeness**

Data Package No. W02330-QES (SDG No.W02330) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-96-22, Rev. 1, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, May 1998.

Due to the lack of a matrix spike and matrix spike duplicate recovery, any RPD calculation for barium would be invalid.

All other laboratory duplicate recovery results were acceptable.

Field Duplicate Samples

One pair of field duplicate samples were submitted to QES for analysis as shown below:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>
BONKT5	BONKT6

The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. The RPD for lead was outside QC limits (48%). Under the BHI statement of work no qualification is required. All other field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against project specific target detection limits (TDLs) to ensure that laboratory detection levels meet the required criteria. All reported laboratory detection levels met the analyte specific TDL.

- **Completeness**

Data package No. W02330-QES (SDG No. W02330) was submitted for validation and verified for completeness. The completion percentage was 87.5%.

MAJOR DEFICIENCIES

Due to a matrix spike recovery of -8.7%, all barium results were rejected and flagged "R".

MINOR DEFICIENCIES

Due to blank contamination, chromium (ICP) results in samples BONKT3 and BONKT4 were qualified as undetected and flagged "U". Due to blank contamination, the lead result in sample BONKT4 was qualified as undetected and flagged "U". Due to a matrix spike recovery of 30% and a matrix spike duplicate

concentration is greater than five times the spike concentration, no qualification is required.

All matrix spike/matrix spike duplicate RPD results were acceptable.

Field Duplicate Samples

One pair of field duplicate samples were submitted to QES for analysis as shown below:

<u>Sample No.</u>	<u>Duplicate Sample No.</u>
BONKT5	BONKT6

The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against project specific target detection limits (TDLs) to ensure that laboratory detection levels meet the required criteria. The reported detection limit was above the TDL for samples BONKT6, BONKT7, BONKT8, and BONKT9. All other reported analytical detection limits were at or below TDLs.

- **Completeness**

Data package No. W02330-QES (SDG No. W02330) was submitted for validation and verified for completeness. The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

DATA QUALIFICATION SUMMARY

SDG: W02330	REVIEWER: TLI	DATE: 08/10/98	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Pu-238	J	BONKT3, BONKT8	Blank contamination
Pu-238	U	BONKT6	Blank contamination
Pu-239/40	J	BONKT3, BONKT4, BONKT5, BONKT6, BONKT7, BONKT9	Blank contamination
Ra-224	J	BONKT3, BONKT4	Blank contamination
Ra-226	J	All	Blank contamination
Pu-239/40	J/UJ	All	LCS recovery
U-238 (Alpha Spec)	J/UJ	All	LCS recovery
K-40	J/UJ	All	RPD
Ra-224	J/UJ	All	RPD
Ra-226	J/UJ	All	RPD
Ra-228	J/UJ	All	RPD

000009

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 4 August 1998

Information request - SDG W02330 - radiochemistry

Precision limits are +/- 30% per the sampling and analysis plan. The original guidance document gives limits of 35% for soils, but differentiates between samples above and below 5x the RDL. Does the above and below 5x the RDL still apply since it has an effect on qualification of data? (Page 7-6 of WHC-SD-EN-SPP-001, Rev. 1)

The "5x" rule still applies to these samples

R2 MW 8-7-98

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanett Duncan

From: Bruce Christian

Pages: 1

Date: 5 August 1998

Information request: SDG 2330 - SVOA

The SAP does not specify DQOs for semi-VOAs. Do the numbers for VOAs apply or do I use the guidance document.

*Use values from SAP if VOAs as much as
not possible*

R2W 8-7-98

Bechtel Hanford, Inc.
3350 George Washington Way
Richland, WA 99352

Attn: BHI Sample Management
MO-105/300 Area
MSIN: LO-20
Phone: 373-5665
FAX: 373-6725

BHI Sample Management

Fax

To: Bruce Christian From: Jeanette Duncan
Fax: 375-5151 Pages: 3
Phone: _____ Date: 8/7/98
Re: _____ CC: _____

☒ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

• Comments:

Closure on IRs

*** ACTIVITY REPORT ***

TRANSMISSION OK

TX/RX NO.	9837	
CONNECTION TEL		3755151
CONNECTION ID		
START TIME	08/07 08:08	
USAGE TIME	01'04	
PAGES	3	
RESULT	OK	

Attn: BHI Sample Management
MO-105/300 Area
MSIN: L0-20
Phone: 373-5665
FAX: 373-6725

Fax

From: Jeanette Duncan

Pages: 4

Date: 8/6/98

CC:

☐ Please Recycle

• **Comments:**

[illegible]

SAMPLE SUMMARY

Project ID:	100 D Areas - Full Protocol	Sampling Team:	ERC Field Sampling
Task ID:	1	Sampling Mgr/Coordinator:	St. John
Operable Unit:	100-DR-1	Samplers:	STANKOVICH, MT
Aggregate Area:	100 Areas	Field Logbook ID:	EL-1339-1;EL-1339-2;EL-1339-3
SAF Number:	B98-022	Sampling Media:	Soil;

Sample Number	Laboratory Number	Location	Analyte Code	Laboratory	Date Collected	Date Shipped	Comments
B0MMM4		107-D1	2,14	Quanterra Incorporated	12/16/97 9:35 AM	12/16/97 3:35 PM	
B0MMM5		107-D1	2,14	Quanterra Incorporated	12/16/97 9:51 AM	12/16/97 3:35 PM	
B0MMM6		107-D1	2,14	Quanterra Incorporated	12/16/97 10:05 AM	12/16/97 3:35 PM	
B0MMM7		107-D1	2,14	Quanterra Incorporated	12/16/97 10:22 AM	12/16/97 3:35 PM	
B0N090		107-D3	2,6,7,8,9,10,11,12,14	Quanterra Incorporated	4/1/98 8:30 AM	4/1/98 3:00 PM	Field Blank
B0N091		107-D3	2,6,7,8,9,10,11,12,14	Quanterra Incorporated	4/1/98 8:40 AM	4/1/98 3:00 PM	Equip Blank for B0N092
B0N092		107-D3	2,6,7,8,9,10,11,12,14	Quanterra Incorporated	4/1/98 10:10 AM	4/1/98 3:00 PM	
B0N093		107-D3	2,6,7,8,9,10,11,12,14	Quanterra Incorporated	4/1/98 9:38 AM	4/1/98 3:00 PM	
B0N094		107-D3	2,6,7,8,9,10,11,12,14	Quanterra Incorporated	4/1/98 10:10 AM	4/1/98 3:00 PM	Dup of B0N092
B0N095		107-D3	2,6,7,8,9,10,11,12,14	Quanterra Incorporated	4/1/98 9:14 AM	4/1/98 3:00 PM	
B0N096		107-D3	2,6,7,8,9,10,11,12,14	Quanterra Incorporated	4/1/98 8:50 AM	4/1/98 3:00 PM	
B0N097		107-D3	15,6,7,8,9,10,11,12,14	TMA/RECRA	4/1/98 10:10 AM	4/1/98 1:00 PM	Split of B0N092
B0NKR4		107-D2	2,6,7,9,10,12,14	Quanterra Incorporated	5/21/98 8:00 AM	5/21/98 1:45 PM	Equip Blank of B0NKR7
B0NKR5		107-D2	2,6,7,9,10,12,14	Quanterra Incorporated	5/21/98 8:15 AM	5/21/98 1:45 PM	
B0NKR6		107-D2	2,6,7,9,10,12,14	Quanterra Incorporated	5/21/98 8:30 AM	5/21/98 1:45 PM	
B0NKR7		107-D2	2,6,7,9,10,12,14	Quanterra Incorporated	5/21/98 8:50 AM	5/21/98 1:45 PM	
B0NKR8		107-D2	2,6,7,9,10,12,14	Quanterra Incorporated	5/21/98 8:50 AM	5/21/98 1:45 PM	Dup of B0NKR7

Project ID: 100 D Areas - Full Protocol

SAF Number: B98-022

Page 1 of 3

Date: 4/27/98 3:22:20 PM

Update

Sample Number	Laboratory Number	Location	Analyte Code	Laboratory	Date Collected	Date Shipped	Comments
BONKR9		107-D2	2,6,7,9,10,12,14	Quanterra Incorporated	5/21/98 9:40 AM	5/21/98 1:45 PM	
BONKT1		107-D2	15,6,7,8,9,10,11,12,14	TMA/RECRA	5/21/98 8:50 AM	5/21/98 1:00 PM	Split of BONKR7
BONKT3		1607-D2	1,2,4,5,6,7,8,9,10,11,14	Quanterra Incorporated	4/15/98 8:05 AM	4/15/98 1:50 PM	Equip Blank of BONKT5
BONKT4		1607-D2	1,2,4,5,6,7,8,9,10,11,14	Quanterra Incorporated	4/15/98 8:20 AM	4/15/98 1:50 PM	Field Blank
BONKT5		1607-D2	1,2,4,5,6,7,8,9,10,11,14	Quanterra Incorporated	4/15/98 8:45 AM	4/15/98 1:50 PM	
BONKT6		1607-D2	1,2,4,5,6,7,8,9,10,11,14	Quanterra Incorporated	4/15/98 8:45 AM	4/15/98 1:50 PM	Dup of BONKT5
BONKT7		1607-D2	1,2,4,5,6,7,8,9,10,11,14	Quanterra Incorporated	4/15/98 9:05 AM	4/15/98 1:50 PM	
BONKT8		1607-D2	1,2,4,5,6,7,8,9,10,11,14	Quanterra Incorporated	4/15/98 9:15 AM	4/15/98 1:50 PM	
BONKT9		1607-D2	1,2,4,5,6,7,8,9,10,11,14	Quanterra Incorporated	4/15/98 9:30 AM	4/15/98 1:50 PM	
BONKV0		1607-D2	1,15,16,5,6,7,8,9,10,11,14	TMA/RECRA	4/15/98 8:45 AM	4/15/98 1:00 PM	Split of BONKT5
BOP0T5		116-DR-9	2,4,6,7,8,9,10,11,12,13,14	Quanterra Incorporated	6/9/98 9:00 AM	6/11/98 1:10 PM	
BOP892		116-DR-9	5,6,7,8,9,10,11,13,14	TMA/RECRA	7/9/98 8:15 AM	7/9/98 4:20 PM	

Analyte Codes:

- 1) Semi-VOA - 8270A (TCL) {Bis(2-ethylhexyl) phthalate}
- 2) Pest/PCBs - 8080 (TCL)
- 3) ICP Metals - 6010A (SW-846) {Chromium, Lead}
- 4) ICP Metals - 6010A (Supertrace) {Arsenic, Barium, Cadmium, Chromium, Lead, Silver}
- 5) Mercury - 7471 - (CV)
- 6) Chromium Hex - 7196
- 7) Gamma Spectroscopy {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}
- 8) Gamma Spec - Add-on {Americium-241, Uranium-238}
- 9) Americium-241
- 10) Isotopic Plutonium
- 11) Isotopic Uranium
- 12) Strontium-89,90 - Total Sr
- 13) Nickel-63
- 14) Activity Scan
- 15) PCBs - 8080

Sample Number	Laboratory Number	Location	Analyte Code	Laboratory	Date Collected	Date Shipped	Comments
---------------	-------------------	----------	--------------	------------	----------------	--------------	----------

16) ICP Metals - 6010A (SW-846) (Arsenic, Chromium, Lead)

17) ICP Metals - 6010A (Supertrace) (Chromium, Lead)

18) Rad Screen

08/06/98

14:04

5093736725

BHI SAMPLE MGT

001

*** ACTIVITY REPORT ***

TRANSMISSION OK

TX/RX NO. .9828

CONNECTION TEL . 3755151

CONNECTION ID

START TIME 08/06 14:02

USAGE TIME 02'00

PAGES 4

RESULT OK

FAX

TECHLAW, INC.

**451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)**

To: Jeanett Duncan

From: Bruce Christian

Pages: 1

Date: 5 August 1998

Information request: SDG 2330 - SVOA

The SAP does not specify DQOs for semi-VOAs. Do the numbers for VOAs apply or do I use the guidance document.

*** ACTIVITY REPORT ***

RECEPTION OK

TX/RX NO.

9803

CONNECTION TEL

509 375 5151

CONNECTION ID

START TIME

08/05 11:04

USAGE TIME

00'20

PAGES

1

RESULT

OK

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 4 August 1998

Information request - SDG W02330 - radiochemistry

Precision limits are +/- 30% per the sampling and analysis plan. The original guidance document gives limits of 35% for soils, but differentiates between samples above and below 5x the RDL. Does the above and below 5x the RDL still apply since it has an effect on qualification of data? (Page 7-6 of WHC-SD-EN-SPP-001, Rev. 1)

BHI Sample Management

Fax

☐ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

This should close the IA

Bechtel Hanford Inc.

B98-022-11

Page 1 of 1

Collector
Mills Stankovich / BRYANT

Project Designation
106 D Area - Full Protocol

for Chest No.

Company Contact
Gary Hamilton

Sampling Location
1607-D2

Field Logbook No.
BL-1339-2

Office Property No.
N/A

Telephone No.
531-0731

Project Coordinator
KOERNER, CC

SAF No.
B98-022

Date Turnaround
15 Days

Method of Shipments
Hand Delivery - Commercial Vehicle

Bill of Lading/Air Bill No.
N/A

Shipped To
Quanta Incorporated

POSSIBLE SAMPLE HAZARD/REMARKS

Special Handling and/or Storage

SDG

W02330

Sample No.	Matrix *	Sample Date	Sample Time	Name	Code	Name	Code	Name	Code	Name	Code	Name	Code	Name	Code
BONKT3	01	Soil	4-15-98	0805	P	aG	aG	aG	aG	aG	aG	aG	aG	aG	aG
BONKT4	02	Soil	4-15-98	0820	1	1	1	1	1	1	1	1	1	1	1
BONKT6	03	Soil	4-15-98	0845	2nd	6th	6th	6th	6th	6th	6th	6th	6th	6th	6th
BONKT6	04	Soil	4-15-98	0845	Activity Box	Chemical Hex - T196	Amplifier 244; Isotope Phosphorus Isotope Uranium	See Item (1) in Special Instructions	Memory 7471 (CV)	Passive 1000 (TCL)	See Item (2) in Special Instructions	See Item (3) in Special Instructions	See Item (4) in Special Instructions	See Item (5) in Special Instructions	See Item (6) in Special Instructions

CHAIN OF POSSESSION

Received By
Date/Time
4-15-98

Received By
Date/Time
4-15-98

Received By
Date/Time
4-15-98

Received By
Date/Time
4-15-98

Signature/Initials

1350

LABORATORY SECTION

Received By

Disposal Method

FINAL SAMPLE DISPOSITION

Disposed By

Date/Time

Special INSTRUCTIONS

OOA - R067D0 2F00

(1) ECP Models - 6010A (Supermodel) (Aspen, Barium, Calcium, Chromium, Lead, Silver)

(2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

Matrix *

S - Soil

SS - Sediment

SO - Solid

SL - Sludge

W - Water

O - Oil

A - Air

DS - Drum Solids

DL - Drum Liquids

T - Tissue

VS - Viscous

L - Liquid

V - Vegetation

X - Other

Dechert LLP

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

B98-022-12

1

[illegible]

FAX

TECHLAW, INC.

451 Hills, Suite 23

Richland, WA 99352

509-375-5667

509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 4 August 1998

Information Request - SDG W02330 - pages 31 & 32

The sample numbers are missing from the chain of custody.

08/04/98

14:21

5093736725

BHI SAMPLE MGT

001

*** ACTIVITY REPORT ***

TRANSMISSION OK

TX/RX NO.	9791	
CONNECTION TEL		3755151
CONNECTION ID		
START TIME	08/04 14:19	
USAGE TIME	02'06	
PAGES	4	
RESULT	OK	

08/04/98

13:52

5093736725

BHI SAMPLE MGT

001

*** ACTIVITY REPORT ***

RECEPTION OK

TX/RX NO. 9790

CONNECTION TEL 509 375 5590

CONNECTION ID

START TIME 08/04 13:50

USAGE TIME 01'19

PAGES 2

RESULT OK

*** ACTIVITY REPORT ***

RECEPTION OK

TX/RX NO.	9787	
CONNECTION TEL		509 375 5151
CONNECTION ID		
START TIME	08/04 12:13	
USAGE TIME	00'21	
PAGES	1	
RESULT	OK	

FAX

TECHLAW, INC.

451 Hills, Suite 23

Richland, WA 99352

509-375-5667

509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 4 August 1998

Information request - SDG W02330 - radiochemistry

Precision limits are +/- 30% per the sampling and analysis plan. The original guidance document gives limits of 35% for soils, but differentiates between samples above and below 5x the RDL. Does the above and below 5x the RDL still apply since it has an effect on qualification of data? (Page 7-6 of WHC-SD-EN-SPP-001, Rev. 1)

The '5x' rule still applies to these samples

R2M 8-7-98

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanett Duncan

From: Bruce Christian

Pages: 1

Date: 5 August 1998

Information request: SDG 2330 - SVOA

The SAP does not specify DQOs for semi-VOAs. Do the numbers for VOAs apply or do I use the guidance document.

*Use values from SAP for VOAs as much as
possible*

R2W 8-7-98

Bechtel Hanford, Inc.
3350 George Washington Way
Richland, WA 99352

Attn: BHI Sample Management
MO-105/300 Area
MSIN: L0-20
Phone: 373-5665
FAX: 373-6725

BHI Sample Management

Fax

To: Bruce Christian From: Jeanette Duncan
Fax: 375-5151 Pages: 3
Phone: _____ Date: 8/7/98
Re: _____ CC: _____

☒ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

• Comments:

Closure on IRs

*** ACTIVITY REPORT ***

TRANSMISSION OK

TX/RX NO.	9837	
CONNECTION TEL		3755151
CONNECTION ID		
START TIME	08/07 08:08	
USAGE TIME	01'04	
PAGES	3	
RESULT	OK	

Bechtel Hanford, Inc.
3350 George Washington Way
Richland, WA 99352

Attn: BHI Sample Management
MO-105/300 Area
MSIN: L0-20
Phone: 373-5665
FAX: 373-6725

BHI Sample Management

Fax

To: Bruce Christian

From: Jeanette Duncan

Fax: 375-5151

Pages: 4

Phone:

Date: 8/6/98

Re:

CC:

☐ Urgent

☐ For Review

☐ Please Comment

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• Comments:

SAMPLE SUMMARY

Project ID:	100 D Areas - Full Protocol	Sampling Team:	ERC Field Sampling
Task ID:	1	Sampling Mgr/Coordinator:	St. John
Operable Unit:	100-DR-1	Samplers:	STANKOVICH, MT
Aggregate Area:	100 Areas	Field Logbook ID:	EL-1339-1;EL-1339-2;EL-1339-3
SAF Number:	B98-022	Sampling Media:	Soil;

Sample Number	Laboratory Number	Location	Analyte Code	Laboratory	Date Collected	Date Shipped	Comments
B0MMM4		107-D1	2,14	Quanterra Incorporated	12/16/97 9:35 AM	12/16/97 3:35 PM	
B0MMM5		107-D1	2,14	Quanterra Incorporated	12/16/97 9:51 AM	12/16/97 3:35 PM	
B0MMM6		107-D1	2,14	Quanterra Incorporated	12/16/97 10:05 AM	12/16/97 3:35 PM	
B0MMM7		107-D1	2,14	Quanterra Incorporated	12/16/97 10:22 AM	12/16/97 3:35 PM	
B0N090		107-D3	2,6,7,8,9,10,11,12,14	Quanterra Incorporated	4/1/98 8:30 AM	4/1/98 3:00 PM	Field Blank
B0N091		107-D3	2,6,7,8,9,10,11,12,14	Quanterra Incorporated	4/1/98 8:40 AM	4/1/98 3:00 PM	Equip Blank for B0N092
B0N092		107-D3	2,6,7,8,9,10,11,12,14	Quanterra Incorporated	4/1/98 10:10 AM	4/1/98 3:00 PM	
B0N093		107-D3	2,6,7,8,9,10,11,12,14	Quanterra Incorporated	4/1/98 9:38 AM	4/1/98 3:00 PM	
B0N094		107-D3	2,6,7,8,9,10,11,12,14	Quanterra Incorporated	4/1/98 10:10 AM	4/1/98 3:00 PM	Dup of B0N092
B0N095		107-D3	2,6,7,8,9,10,11,12,14	Quanterra Incorporated	4/1/98 9:14 AM	4/1/98 3:00 PM	
B0N096		107-D3	2,6,7,8,9,10,11,12,14	Quanterra Incorporated	4/1/98 8:50 AM	4/1/98 3:00 PM	
B0N097		107-D3	15,6,7,8,9,10,11,12,14	TMA/RECRA	4/1/98 10:10 AM	4/1/98 1:00 PM	Split of B0N092
B0NKR4		107-D2	2,6,7,9,10,12,14	Quanterra Incorporated	5/21/98 8:00 AM	5/21/98 1:45 PM	Equip Blank of B0NKR7
B0NKR5		107-D2	2,6,7,9,10,12,14	Quanterra Incorporated	5/21/98 8:15 AM	5/21/98 1:45 PM	
B0NKR6		107-D2	2,6,7,9,10,12,14	Quanterra Incorporated	5/21/98 8:30 AM	5/21/98 1:45 PM	
B0NKR7		107-D2	2,6,7,9,10,12,14	Quanterra Incorporated	5/21/98 8:50 AM	5/21/98 1:45 PM	
B0NKR8		107-D2	2,6,7,9,10,12,14	Quanterra Incorporated	5/21/98 8:50 AM	5/21/98 1:45 PM	Dup of B0NKR7

Project ID: 100 D Areas - Full Protocol

SAF Number: B98-022

Page 1 of 3

Date: 4/27/98 3:22:20 PM

Update

Sample Number	Laboratory Number	Location	Analyte Code	Laboratory	Date Collected	Date Shipped	Comments
BONKR9		107-D2	2,6,7,9,10,12,14	Quanterra Incorporated	5/21/98 9:40 AM	5/21/98 1:45 PM	
BONKT1		107-D2	15,6,7,8,9,10,11,12,14	TMA/RECRA	5/21/98 8:50 AM	5/21/98 1:00 PM	Split of BONKR7
BONKT3		1607-D2	1,2,4,5,6,7,8,9,10,11,14	Quanterra Incorporated	4/15/98 8:05 AM	4/15/98 1:50 PM	Equip Blank of BONKT5
BONKT4		1607-D2	1,2,4,5,6,7,8,9,10,11,14	Quanterra Incorporated	4/15/98 8:20 AM	4/15/98 1:50 PM	Field Blank
BONKT5		1607-D2	1,2,4,5,6,7,8,9,10,11,14	Quanterra Incorporated	4/15/98 8:45 AM	4/15/98 1:50 PM	
BONKT6		1607-D2	1,2,4,5,6,7,8,9,10,11,14	Quanterra Incorporated	4/15/98 8:45 AM	4/15/98 1:50 PM	Dup of BONKT5
BONKT7		1607-D2	1,2,4,5,6,7,8,9,10,11,14	Quanterra Incorporated	4/15/98 9:05 AM	4/15/98 1:50 PM	
BONKT8		1607-D2	1,2,4,5,6,7,8,9,10,11,14	Quanterra Incorporated	4/15/98 9:15 AM	4/15/98 1:50 PM	
BONKT9		1607-D2	1,2,4,5,6,7,8,9,10,11,14	Quanterra Incorporated	4/15/98 9:30 AM	4/15/98 1:50 PM	
BONKV0		1607-D2	1,15,16,5,6,7,8,9,10,11,14	TMA/RECRA	4/15/98 8:45 AM	4/15/98 1:00 PM	Split of BONKT5
BOP0T5		116-DR-9	2,4,6,7,8,9,10,11,12,13,14	Quanterra Incorporated	6/9/98 9:00 AM	6/11/98 1:10 PM	
BOP892		116-DR-9	5,6,7,8,9,10,11,13,14	TMA/RECRA	7/9/98 8:15 AM	7/9/98 4:20 PM	

Analyte Codes:

- 1) Semi-VOA - 8270A (TCL) {Bis(2-ethylhexyl) phthalate}
- 2) Pest/PCBs - 8080 (TCL)
- 3) ICP Metals - 6010A (SW-846) {Chromium, Lead}
- 4) ICP Metals - 6010A (Supertrace) {Arsenic, Barium, Cadmium, Chromium, Lead, Silver}
- 5) Mercury - 7471 - (CV)
- 6) Chromium Hex - 7196
- 7) Gamma Spectroscopy {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}
- 8) Gamma Spec - Add-on {Americium-241, Uranium-238}
- 9) Americium-241
- 10) Isotopic Plutonium
- 11) Isotopic Uranium
- 12) Strontium-89,90 - Total Sr
- 13) Nickel-63
- 14) Activity Scan
- 15) PCBs - 8080

Sample Number	Laboratory Number	Location	Analyte Code	Laboratory	Date Collected	Date Shipped	Comments
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16) ICP Metals - 6010A (SW-846) (Arsenic, Chromium, Lead)

17) ICP Metals - 6010A (Supertrace) (Chromium, Lead)

18) Rad Screen

08/06/98

14:04

5093736725

BHI SAMPLE MGT

001

*** ACTIVITY REPORT ***

TRANSMISSION OK

TX/RX NO.

9828

CONNECTION TEL

3755151

CONNECTION ID

START TIME

08/06 14:02

USAGE TIME

02'00

PAGES

4

RESULT

OK

FAX

TECHLAW, INC.

**451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)**

To: Jeanett Duncan

From: Bruce Christian

Pages: 1

Date: 5 August 1998

Information request: SDG 2330 - SVOA

The SAP does not specify DQOs for semi-VOAs. Do the numbers for VOAs apply or do I use the guidance document.

*** ACTIVITY REPORT ***

RECEPTION OK

TX/RX NO. 9803

CONNECTION TEL 509 375 5151

CONNECTION ID

START TIME 08/05 11:04

USAGE TIME 00'20

PAGES 1

RESULT OK

FAX

TECHLAW, INC.

**451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)**

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 4 August 1998

Information request - SDG W02330 - radiochemistry

Precision limits are +/- 30% per the sampling and analysis plan. The original guidance document gives limits of 35% for soils, but differentiates between samples above and below 5x the RDL. Does the above and below 5x the RDL still apply since it has an effect on qualification of data? (Page 7-6 of WHC-SD-EN-SPP-001, Rev. 1)

Bechtel Hanford, Inc.
3350 George Washington Way
Richland, WA 99352

Attn: BHI Sample Management
MO-105/300 Area
MSIN: L0-20
Phone: 373-5665
FAX: 373-6725

BHI Sample Management

Fax

To: Bruce Christian From: Jeanette Duncan
Fax: 375-5151 Pages: 4
Phone: 375 Date: 8/4
Re: _____ CC: _____

☐ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

• Comments:

This should close the IR

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

B98-022-11

Page 1 of 1

Bechtel Hanford Inc.

Collector Mike Strawnich / JSRYANT		Company Contact Gary Hamilton		Telephone No. 531-0731		Project Coordinator KOERNER, CC		Data Turnaround 15 Days	
Project Designation 100 D Areas - Full Protocol		Sampling Location 1607-D2		SAF No. B98-022		Method of Shipment Hand Delivery - Government Vehicle			
Ice Chest No.		Field Logbook No. SL-1539-2		SHIP of Loading/Air Bill No.					
Shipped To Quanta Incorporated		Office Property No. N/A		N/A					
POSSIBLE SAMPLE HAZARDS/REMARKS									
Special Handling and/or Storage									
<div style="display: flex; justify-content: space-between;"> <div>804260</div> <div>SAMPLE ANALYSIS</div> <div>SDG- W02330</div> </div>									
Sample No.	Matrix *	Sample Date	Sample Time	Activity	Chemical	Analysis	Soil Test (1) in Special Instructions	Soil Test (2) in Special Instructions	Soil Test (3) in Special Instructions
BONKT3 01	Soil	4-15-98	0805	X	X	X	X	X	X
BONKT4 02	Soil	4-15-98	0800	X	X	X	X	X	X
BONKT5 03	Soil	4-15-98	0845	X	X	X	X	X	X
BONKT6 04	Soil	4-15-98	0845	X	X	X	X	X	X
<div style="display: flex; justify-content: space-between;"> <div>804260</div> <div>SAMPLE ANALYSIS</div> <div>SDG- W02330</div> </div>									
CHAIN OF POSSESSION		Signature/Initial Names		1350		SPECIAL INSTRUCTIONS			
Relinquished By		Date/Time		Date/Time		(1) ICP Metals - 4010A (Supernova) (Arsenic, Barium, Cadmium, Chromium, Lead, Silver)			
Relinquished By		Date/Time		Date/Time		(2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155)			
Relinquished By		Date/Time		Date/Time		(3) Gamma Spec - Add-on (Americium-241, Uranium-238)			
Relinquished By		Date/Time		Date/Time		Matrix *			
LABORATORY SECTION		Received By		Date/Time		Soil			
FINAL SAMPLE DISPOSITION		Disposal Method		Date/Time		SL			
		Disposal Method		Date/Time		SO			
		Disposal Method		Date/Time		SL			
		Disposal Method		Date/Time		W			
		Disposal Method		Date/Time		O			
		Disposal Method		Date/Time		A			
		Disposal Method		Date/Time		DS			
		Disposal Method		Date/Time		DL			
		Disposal Method		Date/Time		T			
		Disposal Method		Date/Time		WS			
		Disposal Method		Date/Time		L			
		Disposal Method		Date/Time		V			
		Disposal Method		Date/Time		X			

1003

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

898-022-14

Dochtel Hanford Inc.		Company Contact Ory Henson		Telephone No. 531-0731		Project Coordinator KOERNER, CC		Data Turnaround 15 Days			
Collector Mike Stankovich / BRYANT		Sampling Location 106 D Areas - Full Protocol		Field Logbook No. EL-1339-2		Method of Shipment Hand Delivery - Government Vehicle		SAF No. B98-422			
Ice Chest No.		Offsite Property No. N/A		Date of Loading/Air Bill No. N/A							
POSSIBLE SAMPLE HAZARDS/REMARKS											
Special Handling and/or Storage											
SAMPLE ANALYSIS											
Sample No.	Matrix *	Sample Date	Sample Time	Activity Score	Chromium Hrs. - 7196	Arsenic 241; Inorganic Phosphorus Inorganic Chromium	See item (I) in Special Instructions	Mercury 7471 - (CV)	Pert/PCB 9999 (TCL)	Semi-VOL ETMA (TCL) [B] (2) adipic acid phthalic	See item (2) in Special Instructions
BANK 7	05	4-15-98	0905	X	X	X	Y	X	X	X	804261
BANK 6	06	4-15-98	0915	X	X	X	X	X	X	X	804261
BANK 9	07	4-15-98	0930	X	X	X	X	X	X	X	804261
CHAIN OF POSSESSION		Signature Names		Date/Time		Date/Time		Date/Time		Date/Time	
Received By		Received By		Received By		Received By		Received By		Received By	
Date/Time		Date/Time		Date/Time		Date/Time		Date/Time		Date/Time	
LABORATORY SECTION		Received By		Date/Time		Date/Time		Date/Time		Date/Time	
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By		Date/Time		Date/Time		Date/Time	

SPECIAL INSTRUCTIONS

COA - R667D3 2F06

- (1) ICP Metals - 6010A (Supertrace) (Arsenic, Barium, Cadmium, Chromium, Lead, Silver)
- (2) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Americium-241, Uranium-238)

MATRIX *

- S - Soil
- SE - Sediment
- SO - Solid
- SL - Sludge
- W - Water
- O - Oil
- A - Air
- DS - Debris
- DL - Debris
- WL - Waste
- L - Liquid
- V - Vegetation
- X - Other

2300

FAX

TECHLAW, INC.

**451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)**

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 4 August 1998

Information Request - SDG W02330 - pages 31 & 32

rad

The sample numbers are missing from the chain of custody.

*** ACTIVITY REPORT ***

TRANSMISSION OK

TX/RX NO.	9791	
CONNECTION TEL		3755151
CONNECTION ID		
START TIME	08/04 14:19	
USAGE TIME	02'06	
PAGES	4	
RESULT	OK	

*** ACTIVITY REPORT ***

RECEPTION OK

TX/RX NO. 9790

CONNECTION TEL 509 375 5590

CONNECTION ID

START TIME 08/04 13:50

USAGE TIME 01'19

PAGES 2

RESULT OK

*** ACTIVITY REPORT ***

RECEPTION OK

TX/RX NO.

9787

CONNECTION TEL

509 375 5151

CONNECTION ID

START TIME

08/04 12:13

USAGE TIME

00'21

PAGES

1

RESULT

OK